EDITORS
ASSOC. PROF. DR. ŞADİYE DUR
PROF. DR. RENMIR JAN MAALA

INNOVATIVE APPROACHES IN NURSING AND HEALTH CARE MANAGEMENT

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Assoc. Prof. Şadiye Dur graduated from Ege University, School of Nursing, in 2010. Following her undergraduate studies, she worked as a nurse in the Neonatal Intensive Care Unit of Ege University Children's Hospital and the Pediatric Unit of the American Hospital from 2010 to 2011. She completed her Master's degree in 2014 and her Ph.D. in 2019 in Pediatric Nursing at the Florence Nightingale Faculty of Nursing, Istanbul University.

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He completed his basic education in Baybay North Central School in Leyte Philippines, with his High School, he attended it in Franciscan College of Immaculate Conception in Leyte Philippines. He graduated Bachelor of Science in Nursing in University of Cebu in Cebu City Philippines. Garnered his license as Registered Nurse. He also obtained his Master of Arts in Nursing and Doctor of Philosophy in Nursing. He is a member of Global Society for Philippine Nurse Researcher, Inc where he excels in disaster nursing research. He spends his nursing career as a professor in University of Mindanao, Davao Doctors College and also taught as a professor in the graduate school of Nursing in University of St Louis Tuguegarao Philippines. Now, he dedicates his nursing career thru academics and clinical practice.

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ŞADİYE DUR, Renmir Jan D. MAALA

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PREFACE

It is a privilege to introduce *Innovative Approaches in Nursing and Health Care Management*, a comprehensive exploration of transformative practices that shape the future of health care delivery. This volume brings together a collection of perspectives, research findings, and applied methodologies that underscore the pivotal role of innovation in advancing patient care and fostering organizational resilience. In today's rapidly evolving health care landscape, nurses and health care leaders are confronted with complex challenges, from the integration of new technologies to addressing workforce dynamics and patient-centered care models. This book serves as both a guide and a source of inspiration for professionals seeking to navigate these complexities with creativity and evidence-based strategies. The chapters contained within these pages highlight a diverse array of topics, including the implementation of digital tools in clinical settings, thedevelopment of sustainable health care policies, and innovative educational approaches that prepare the next generation of nurses. Each contribution offers valuable insights, practical frameworks, and real-world applications that reflect the dynamic nature of modern health care systems.

As you delve into this book, we encourage you to embrace the innovative spirit that underpins its creation. May it inspire you to challenge conventional thinking, foster collaboration, and contribute to a health care environment that prioritizes excellence, compassion, and inclusivity.We extend my gratitude to the authors and contributors who have enriched this work with their expertise and vision. Their dedication to advancing the field of nursing and health care management is evident in every chapter. Let this book serve as a catalyst for meaningful change, empowering readers to reimagine the possibilities in their professional practice and beyond.

Assoc. Prof. Şadiye DUR,

PROF. DR. Renmir Jan D.
MAALA

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Chapter 1

The Use of Electronic Health Record Systems In School Health Nursing: The Impact of Digital Transformation

ŞADİYE DUR[1], MÜGE COŞĞUN[2]

Electronic Health Records

As defined by the Turkish Ministry of Health, electronic health records (EHRs) are a repository of information recorded, stored, transmitted, accessed, associated, and processed using electronic systems about individuals' past, present, and future physical and mental health conditions or illnesses (Turkish Ministry of Health, 2020). When used meaningfully, this repository maintains all records that are useful, effective, ethical, and easily accessible within regulated boundaries (Secginli *et al.,* 2014; Kose *et al.,* 2020). The EHR system includes components such as a patient's health and disease history, clinical decision support systems, imaging archives, and electronic medication management records (Bani Issa *et al.,* 2020).

EHR systems have the potential to enhance the quality of care, improve patient safety, facilitate health professionals' access to a patient's health information, increase the efficiency of health record services, ensure appropriate use of resources, and improve communication among health professionals by supporting them through electronic data processing and information exchange (Moore *et al.,* 2020; Kutney-Lee *et al.,* 2021; Vos *et al.,* 2020). Due to these potential benefits, EHR systems are rapidly being implemented in the healthcare environments of many countries (Laires *et al.,* 2023; Tsai *et al.,* 2020). However, the adoption rate of such systems in primary care settings like schools remains low (Secginli *et al.,* 2014). The acceptance of EHRs by health professionals, who are the users of electronic information systems, is a significant factor in enhancing their

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effective use. Understanding the attitudes of health professionals towards EHR systems is crucial for the future success of these electronic systems (Moy *et al.,* 2021; Kutney-Lee *et al.,* 2021).

EHRs are systems that store and manage patients' health information digitally. These records contain critical health data such as patients' medical histories, diagnoses, treatment plans, laboratory results, and medication prescriptions. EHR systems ensure that healthcare services are delivered more effectively and efficiently (Bani Issa *et al.,* 2020). They offer significant advantages for quick access to patient information, better patient care, reduction of errors, improved communication among healthcare providers, and the analysis of health data. Additionally, having instant access to accurate and up-to-date information during emergencies is crucial for patient health and safety (Buchanan *et al.,* 2024). A study highlighted that the anonymized use of digital health records for research purposes is becoming increasingly common, offering significant opportunities for scientific research. However, it was noted that public concerns about the inappropriate use of data must be addressed. The study argued that giving patients the right to determine who has access to their digital health records is a more ethical and reliable approach. This perspective emphasizes the importance of ethical principles regarding the privacy and security of health data (Spencer *et al.,* 2016). Similarly, another study emphasized that EHRs raise ethical concerns for individuals in terms of privacy, security, and confidentiality (Entzeridou *et al.,* 2018).

The literature emphasizes the need for EHRs that include individuals' lifelong health records to enable all healthcare providers to quickly access the information needed during a patient's treatment. This requirement is vital for improving the quality of patient care, minimizing medical errors, and enhancing the coordination of healthcare services (Tsai *et al.,* 2020; Moy *et al.,* 2021).

EHRs play a crucial role in nursing practice by enhancing the quality, safety, and efficiency of healthcare services (Moore *et al.,* 2020). Nurses can instantly access patient information using EHR systems at all stages of patient care. This accelerates nurses' decision-making processes and minimizes potential errors (Brown *et al.,* 2020). EHR systems allow nurses to record and update patient monitoring data, vital signs, medication management, and treatment plans, ensuring holistic and continuous patient care (Bell *et al.,* 2020; Moore *et al.,* 2020). The literature shows that the use of EHRs in healthcare delivery improves the quality and safety of patient care and reduces communication errors (Brown *et al.,* 2020; Moy *et al.,* 2021). Integrated EHRs with clinical decision support systems help nurses adopt good care practices. Additionally, electronic medication management systems emerge as an important tool to prevent medication errors, enabling nurses to manage medication treatments more safely and accurately (Bell *et al.,* 2020).

Use of Electronic Health Records in School Health Nursing

The National Association of School Nurses (NASN) believes that EHR software platforms are essential tools for all school nurses. EHRs support school nurses' capacity to enhance the coordination, quality, safety, efficiency, effectiveness, and equity of health services in accordance with 21st-century nursing practice standards. This practice supports the opportunity for continuous education for school-aged youth (NASN, 2024).

School nurses are responsible for recording and maintaining student health information and accurately, completely, and securely documenting nursing care and treatment provided to students in the record system (NASN, 2020; Nicholson and Johnson, 2020). This responsibility is critical for monitoring student health and improving the quality of care (Baker and Gance-Cleveland, 2021). The most efficient, effective, and secure method for managing student health information is the use of EHRs (Bergren and Maughan, 2019). EHR systems allow school health nurses to access student health information instantly, facilitating quick and effective interventions. Through these systems, critical data such as student health records, immunization statuses, chronic disease management, and emergency information can be securely and accessibly stored (Baker and Gance-Cleveland, 2021).

Particularly in countries like the United States, Canada, Australia, and some European countries, the widespread use of EHR systems in school health nursing is observed (Selekman *et al.,* 2016). In these countries, the use of digital records has strengthened the coordination and integration of health services and provided a more holistic response to students' health needs. EHR systems help nurses continuously monitor students' health, analyze health trends, and identify situations requiring early intervention (NASN, 2024).

EHRs also facilitate more effective communication between school health nurses and other healthcare professionals and parents (Baker and Gance-Cleveland, 2021). The use of EHRs in school health nursing significantly improves the quality and efficiency of student health services. This system's use in the school setting is particularly advantageous for case management and care coordination efforts for students with complex health needs and chronic conditions (Dandridge, 2019; Davis *et al.,* 2021; Nicholson and Johnson, 2020). Various studies show that EHR systems enable nurses to quickly access and update student health information. For instance, a study in New York found that using EHRs allowed nurses to analyze health information more reliably, contributing to the monitoring of student health and the planning of early interventions (Cowie *et al.,* 2017). Another study found that EHR systems standardized school nurses' work processes, reduced error rates, lowered healthcare costs, and increased student health safety by facilitating rapid information sharing during emergencies (Wager *et al.,* 2017). These findings demonstrate that integrating EHR systems into school health nursing practice provides significant benefits in protecting and improving student health.

However, there are some challenges in the use of EHRs in school health nursing. Factors such as technical infrastructure deficiencies, data security concerns, and user training requirements can limit the effective use of EHRs (Baker and Gance-Cleveland, 2021; Bergren and Maughan, 2019).

Effective use of EHR systems ensures the security of legal student health records and enables efficient school nursing workflows, regular record-keeping, error prevention, and information access. The documents entered by school nurses into these systems produce usable data that can be monitored, collected, extracted, compared, analyzed, and utilized to track and measure trends and outcomes (Bergren and Maughan, 2019). EHR data form the basis for reports, program evaluations, quality improvement projects, evidence-based decision-making, inclusion of good clinical practices in care, advocacy, policy development, and research activities (Bergren and Maughan, 2019; Vos *et al.,* 2020; NASN, 2020). Transforming EHR data into measurable evidence provides more effective care to improve student health, reduce health-related barriers to learning, and support educational success (Nicholson and Johnson, 2020).

Information software compatible with EHR can facilitate data recording and sharing these data with other public and population health organizations (Dandridge, 2019). Community health monitoring and surveillance are ensured through the reporting of school EHR data, such as health screenings, immunization status, infectious disease rates, chronic disease prevalence, environmental exposures, and the impact of school nursing interventions (Nicholson and Johnson, 2020). The data recorded in the EHR system are particularly critical during pandemics or other public health emergencies (Baker *et al.,* 2020).

Conclusion and Recommendations

The use of EHR systems in nursing is of great importance for improving the quality of patient care, enhancing the efficiency of healthcare services, and ensuring the standardization of nursing practice. Through EHRs, nurses make valuable contributions to healthcare systems by providing safer, more efficient, and coordinated care.

Globally, the use of EHRs in school health nursing contributes to protecting and improving student health. The widespread adoption of these systems positively affects student health by contributing to the more effective and holistic delivery of healthcare services. EHRs are an essential tool for school nurses to efficiently and effectively manage health information to optimize the quality, safety, and coordination of student health services and improve student health. The use of EHRs supports the delivery of sustainable, equitable, evidence-based, and student-centered health services, enhancing school nursing practices.

References

Baker, C., & Gance-Cleveland, B. (2021). Linking school nurses with health care systems using EHRs: An integrative review. The Journal of School Nursing, 37(1), 28-40.

Baker, C., Galemore, C. A., & Lowrey, K. M. (2020). Information sharing in the school setting during a public health emergency. NASN School Nurse, 35(4), 198–202. https://doi.org/10.1177/ 1942602X20925031

Bani Issa, W., Al Akour, I., Ibrahim, A., Almarzouqi, A., Abbas, S., Hisham, F., & Griffiths, J. (2020). Privacy, confidentiality, security and patient safety concerns about electronic health records. International nursing review, 67(2), 218-230.

Bell, S. K., Delbanco, T., Elmore, J. G., Fitzgerald, P. S., Fossa, A., Harcourt, K., ... & DesRoches, C. M. (2020). Frequency and types of patient-reported errors in electronic health record ambulatory care notes. JAMA network open, 3(6), e205867-e205867.

Bergren, M. D., & Maughan, E. D. (2019). The school nurse's role in evidence-based practice, quality improvement, and research. In J. Selekeman, R. A. Shannon, & C. F. Yonkaitis (Eds.), School nursing: A comprehensive text (3rd ed., pp. 96–115). F.A. Davis.

Brown, J., Pope, N., Bosco, A. M., Mason, J., & Morgan, A. (2020). Issues affecting nurses' capability to use digital technology at work: An integrative review. Journal of clinical nursing, 29(15-16), 2801-2819.

Buchanan, Z., Hopkins, S. E., Ryman, T. K., Austin, M. A., Wiener, H. W., Tiwari, H. K., ... & Fohner, A. E. (2024). Electronic health record reveals community-level cardiometabolic health benefits associated with 10 years of community-based participatory research. Public Health, 232, 38-44.

Cowie, M. R., Blomster, J. I., Curtis, L. H., Duclaux, S., Ford, I., Fritz, F., ... & Zannad, F. (2017). Electronic health records to facilitate clinical research. Clinical Research in Cardiology, 106(1), 1-9.

Dandridge, S. (2019). Improving school health services for children in Philadelphia: An evaluation report for the school district of Philadelphia. PolicyLab at Children's Hospital of Philadelphia.

https://policylab.chop.edu/sites/default/files/pdf/publications/ Improving- School-Health-Services-for-Children-in-Philadelphia.pdf

Davis, D., Maughan, E. D., White, K. A., & Slota, M. (2021). School nursing for the 21st century: Assessing scope of practice in the current workforce. The Journal of School Nursing, 37(5), 374–386. https://doi.org/10.1177/1059840519880605

Entzeridou, E., Markopoulou, E., & Mollaki, V. (2018). Public and physician's expectations and ethical concerns about electronic health record: Benefits outweigh risks except for information security. International Journal of Medical Informatics, 110, 98-107.

Kose, I., Rayner, J., Birinci, S., Ulgu, M. M., Yilmaz, I., Guner, S., ... & MoH Team Esra Zehir Berrin Gundogdu Mert Ozcan Ceyhan Vardar Behcet Altinli Jale Sungur Hasancebi. (2020). Adoption rates of electronic health records in Turkish Hospitals and the relation with hospital sizes. BMC Health Services Research, 20, 1-16.

Kutney-Lee, A., Carthon, M. B., Sloane, D. M., Bowles, K. H., McHugh, M. D., & Aiken, L. H. (2021). Electronic health record usability: associations with nurse and patient outcomes in hospitals. Medical Care, 59(7), 625-631.

Laires, P. A., Evans, J., Thompson, J., Manwani, R., Mudumby, P., Field, M., & Fang, S. (2023). Prevalence, Incidence, and Characterization of LIGHT Chain Amyloidosis in the USA: A Real-World Analysis Utilizing Electronic Health Records (EHR). Blood, 142, 6767.

Moore, E. C., Tolley, C. L., Bates, D. W., & Slight, S. P. (2020). A systematic review of the impact of health information technology on nurses' time. Journal of the American Medical Informatics Association, 27(5), 798-807.

Moy, A. J., Schwartz, J. M., Chen, R., Sadri, S., Lucas, E., Cato, K. D., & Rossetti, S. C. (2021). Measurement of clinical documentation burden among physicians and nurses using electronic health records: a scoping review. Journal of the American Medical Informatics Association, 28(5), 998-1008.

National Association of School Nurses (NASN) (2024). National Association of School Nurses Position Statement: Electronic Health Records: An Essential School

Nursing Tool for Supporting Student Health. The Journal of School Nursing, 40(3), 352–354. https://doi. org/10.1177/10598405241241804

Nicholson, C., & Johnson, K. H. (2020). Unlocking the power of school nursing documentation. NASN School Nurse, 35(4), 203–207. https://doi.org/10.1177/1942602X20928053

Secginli, S., Erdogan, S., & Monsen, K. A. (2014). Attitudes of health professionals towards electronic health records in primary health care settings: a questionnaire survey. Informatics for Health and Social Care, 39(1), 15-32.

Selekman, J., Wolfe, L. C., & Cole, M. (2016). What data do states collect related to school nurses, school health, and the health care provided?. The Journal of School Nursing, 32(3), 209-220.

Spencer, K., Sanders, C., Whitley, E. A., Lund, D., Kaye, J., & Dixon, W. G. (2016). Patient perspectives on sharing anonymized personal health data using a digital system for dynamic consent and research feedback: a qualitative study. Journal of medical Internet research, 18(4), 66.

Turkey Ministry of Health. (2020) Elektronic Health Record. https://dijitalhastane.saglik.gov.tr/TR,4874/ehr-electronic-healthrecord%2D%2D-esk-elektronik-saglik-kaydi.html

Tsai, C. H., Eghdam, A., Davoody, N., Wright, G., Flowerday, S., & Koch, S. (2020). Effects of electronic health record implementation and barriers to adoption and use: a scoping review and qualitative analysis of the content. Life, 10(12), 327.

Vos, J. F., Boonstra, A., Kooistra, A., Seelen, M., & Van Offenbeek, M. (2020). The influence of electronic health record use on collaboration among medical specialties. BMC health services research, 20, 1-11.

Wager, K. A., Lee, F. W., & Glaser, J. P. (2017). Health Care Information Systems: A Practical Approach for Health Care Management. John Wiley & Sons.

CLINICAL SKILLS ASSESSMENT WORKSHOP IN MULTIDISCIPLINARY GROUPS IN THE FIELD OF HEALTH: OBJECTIVE STRUCTURED CLINICAL EXAMS

Dilek ÖZMEN, Kıvan ÇEVİK KAYA, Dilek ÇEÇEN ÇAMLI, Çiğdem Gamze ÖZKAN, Damla ŞAHİN BÜYÜK

Chapter 2

Clinical Skills Assessment Workshop in Multidisciplinary Groups in The Field of Health: Objective Structured Clinical Exams

DİLEK ÖZMEN[1], KIVAN ÇEVİK KAYA[2], DİLEK ÇEÇEN ÇAMLI[3],ÇİĞDEM GAMZE ÖZKAN[4]*,DAMLA ŞAHİN BÜYÜK[5]

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1. INTRODUCTION

Higher education institutions are recognized as one of the most strategic institutions of a country. Universities are institutions that initiate development in every field through scientific processes, produce knowledge and serve humanity by making it available to the country and society. It is considered necessary to strengthen the professional development of academic staff and increase their professional competencies in order to provide more qualified education services at universities. Because in the information age we are in, it is not possible for any professional, including faculty members, to provide qualified services without continuously renewing and improving themselves. For this reason, the importance of courses and trainings aimed at improving vocational education, which can be evaluated within lifelong education activities, emerges in higher education institutions as in every institution. The activities carried out to increase the knowledge and skills of educators through courses and training programs aim to increase the quality of education services of universities by increasing the quality of educators (Tekerek and Sağır, 2020).

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An important issue that makes educator training necessary is to respond to the needs of society. The fact that faculties have the duty to train professionals who provide health services to the society requires that the members of the profession be trained according to the needs of the society. The needs of the society are changing day by day and in parallel, the information load is increasing exponentially. Therefore, it is necessary for the candidates of the profession, that is, the students receiving the current education, to learn the latest form of knowledge. Being aware of this fact, educators need to develop themselves in terms of education in order to graduate students with the ability to adapt to change and internalize lifelong learning. Accreditation and accountability are two other important elements that necessitate trainings that serve the continuous development understanding of educators. It is necessary to strengthen the accountability of many institutions that educate students in the field of Health Sciences for whether the professionals fulfill their responsibilities towards the society and to increase the competencies of educators by receiving qualified trainings, which are among the mandatory conditions for accreditation (Tekerek and Sağır, 2020).

The competencies of educators, the process of transition from teacher-centered teaching to learner-centered education, changing educational programs, student profile and educational methods have also made change mandatory. In this context, along with active learning methods, which have become more important with the changing student profile, measurement and evaluation methods for measuring students' knowledge and skills have also changed. Especially in institutions that train professional candidates in the field of health sciences, the oral or clinical exams preferred for the measurement of professional skills should be structured in accordance with the content targeted in the student's education program, give similar results when applied to different faculty members and/or different students, and have clear evaluation criteria. For this purpose, valid and reliable assessment and evaluation tools should be preferred and used appropriately to evaluate student performance. In this context, the use of structured clinical exams in the field of health sciences is very important in order to provide objective evaluations, to train more competent students and to provide better quality patient care. In order for educators to achieve these goals, it is necessary for them to improve themselves with trainings on structured clinical assessment methods and more practices should be carried out to make it widespread. In the literature, it has been determined that the studies conducted with educators on structured clinical evaluation methods are limited and there are no studies evaluating the effectiveness of the training received by the instructors.

Today, the changes and developments in education systems have changed the education programs towards a learner-centered approach that supports the individual learning of learners, ensures their active participation, and emphasizes the role of the educator as a guide/director. According to this approach, the active party in learning is the learner himself/herself, and the role of the educator targeted in educator trainings is defined not in terms of dominance, but in terms of facilitating learning. All these changes have also affected measurement and evaluation approaches, methods and tools, which are important elements of the educational process. Traditional assessment methods and tools, which aim to grade learners and are outcome/product-oriented, have been replaced by assessment methods and tools that evaluate learners' higher level learning and competencies (Şenyuva and Şen, 2023). This situation requires the trainer to have many skills. These skills can be expressed under 6 headings:

1. Facilitator: Mentoring, learning facilitation (learning facilitator)

2. Role model: Role modeling at work, role modeling in teaching

3. Information provider: Lecturer, clinical/practical teaching

4. Resource developer: Material development, production of study guides

5. Planner: Curriculum development, instructional design

6. Evaluator: Assessing the learner and the program (Kıyak, 2019)

In order for educators to acquire the skills mentioned above and to use assessment and evaluation methods safely, they need to receive continuous training to improve themselves and to make objective evaluations by using correct assessment methods.

2.1. Use of Measurement and Evaluation Methods in Health Sciences

Standard measurement tools are needed to determine the level of achievement of the goals and behaviors determined in the field of health sciences (Onay and İntepeler, 2023. Assessment-evaluation methods used to evaluate student achievement constitute the most important element of the educational process and guide learning. It is extremely important for educators to know the assessment methods and tools well, to define the learning objectives clearly, and to use assessment methods and tools appropriate to the aims and objectives of the subject in order to realize an effective and efficient assessment (Preston et. al., 2019). In this sense, the preferred assessment and evaluation methods must be valid and reliable, and acceptable in terms of faculty members, students, administration, cost, infrastructure facilities and support staff (Kaya,2023). Failure to use appropriate tools or methods to measure learning outcomes may be insufficient to evaluate student performance (Memon, 2020; Özden, 2022; Sam, 2017)

Accurate assessment of the knowledge, skills and attitudes of students studying in the field of Health Sciences is critical for their professional development and employment (Hanshaw and Dickerson, 2020). In nursing education, practice skills are developed by evaluating skills and attitudes as well as theoretical knowledge, and different assessment-evaluation methods are used.

Considering that students have different learning methods, various methods should be used to assess their competencies by measuring their knowledge, attitudes and skills (Sola-Pola et. al., 2020) . In nursing education, as in every field of education, measurement and evaluation methods such as written exams, homework and projects are used in the measurement of cognitive learning, while measurement and evaluation methods that include the evaluation of psychomotor skills as well as knowledge are used in the evaluation of behavioral learning (Akın Korhan, Tokem, Uzelli Yılmaz and Dilemek, 2016). As with other types of examinations, oral or clinical examinations preferred for the measurement of skills should be structured in accordance with the content targeted in the student's education program, yield similar results when applied to different faculty members and/or different students, and have clear evaluation criteria.

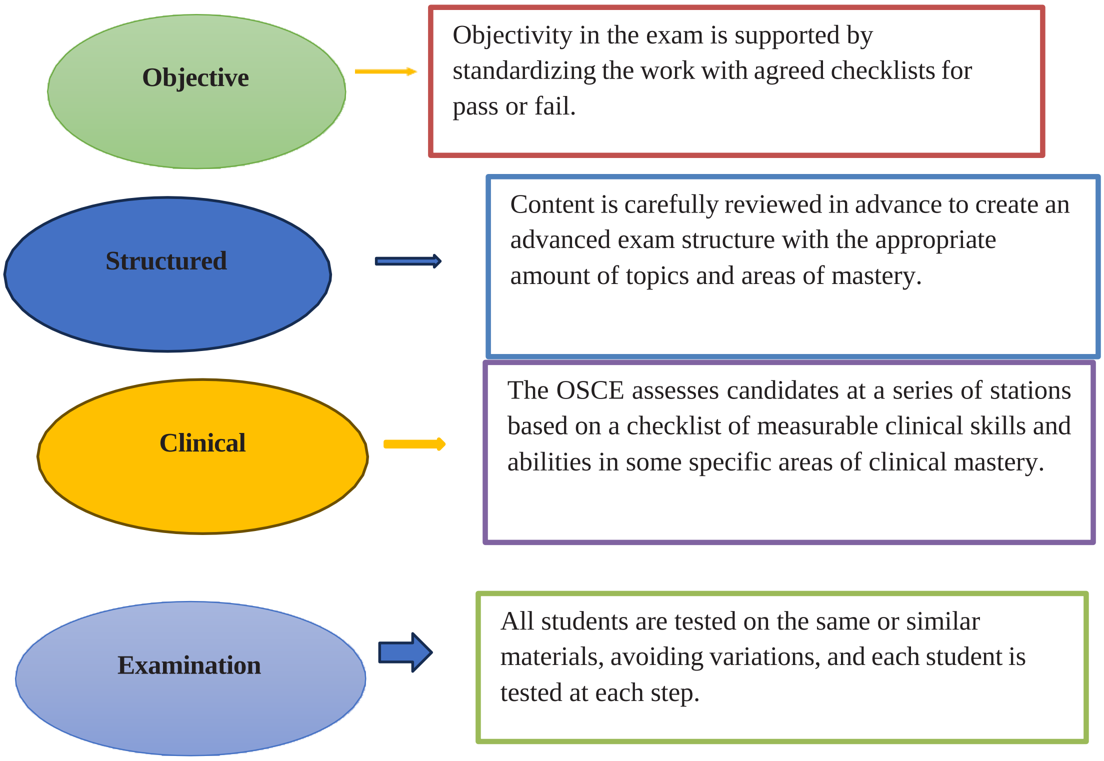
Structured clinical exams are very important for nursing, midwifery and medicine in order to train better quality students, to provide better quality patient care and to provide objective evaluations. There is a need to increase the knowledge and competencies of instructors in order to carry out such exam organizations, which are becoming more and more common in our country. In undergraduate programs where structured clinical skills assessment exams are applied, it is known that both faculty members give positive feedback and students are satisfied with the experience (Divya, Valsaraj, Qutishat and Al Abri, 2019; Bani-Issa, Al Tamimi, Fakhry and Al Tawil, 2019).

As the learning process of health-related units has its own learning experiences and methods, measurement and evaluation is also unique. Therefore, in order to provide a good education, trainers should have knowledge about learning experiences, methods and assessment-evaluation and they should be able to select and develop appropriate learning methods and assessment-evaluation tools in their own educational processes (Onay and İntepeler, 2023; Stanley, Coman, Murdoch and Stanley, 2020). In health education, methods such as multiple-choice exams, case-based multiple-choice and written exams, oral exams, Objective Structured Clinical Examination (OSCE), checklists, etc. are generally used in assessment-evaluation methods (Buluta, Sapancı, and Karac, 2015).

In the National Core Education Program for Nursing (HUÇEP) and National Core Education Program for Medical Education (UÇEP), measurement and evaluation methods such as OSCE and CORE, which will enable process and outcome evaluation in education used to test whether students have gained the expected competencies in knowledge, attitudes and skills, are also included (UÇEP, 2020; HUÇEP, 2022). In HUÇEP-2022, it is stated that basic nursing practices should be at "Level 3", which corresponds to the "does level" according to the Miller pyramid, which is defined as "performing the practice independently, accurately, safely, and skillfully in accordance with the learning goal/learning outcome" (Nursing National Core Education Program (HUÇEP, 2022). For this reason, it should be ensured that the student's performance is measured with methods that evaluate the student's ability to perform the relevant skill application by using measurement-evaluation methods prepared over the upper steps of Bloom's Taxonomy from the lower steps such as knowing and comprehension (Onay and İntepeler, 2023).

2.2. Objective Structured Clinical Examinations

Objective structured clinical examinations are stated to be a summative, formative, valid and reliable assessment method (John, 2020; Solà-Pola et.al., 2020; Yuan, 2021) for measuring knowledge, attitudes and skills. Since these exams reflect the real-life clinical environment, their use in evaluating student skills and clinical competence in the field of health is increasing day by day. OSCE, which stands for Objective Structured Clinical Examination, is defined as "Objective", "Structured", "Clinical", "Examination" (Denat and Tuğrul, 2012) (Figure 1)



Objectivity in the exam is supported by standardizing the work with agreed checklists for pass or fail.

Content is carefully reviewed in advance to create an advanced exam structure with the appropriate amount of topics and areas of mastery.

The OSCE assesses candidates at a series of stations based on a checklist of measurable clinical skills and abilities in some specific areas of clinical mastery.

All students are tested on the same or similar materials, avoiding variations, and each student is tested at each step.

Figure 1. Summary of the OSCE process

OSCE is used as an official method to assess practice competence in many academic institutions and nursing clinical courses around the world (Bani-Issa et. al., 2019; Mohsen, Elzyen, Riad and El-Abbassy, 2021). OSCE is a valid strategy used to assess students' readiness to apply the practices and skills expected of them during clinical practice at the desired level. Since these exams reflect the real-life clinical environment, their use in assessing student skills and clinical competence in the health field is increasing day by day (Shen et. al., 2018).

2.2.1 Historical Process of Objective Structured Clinical Examinations: The OSCE was developed in the 1970s to measure students' cognitive knowledge, effective communication and psychomotor clinical skills in an objective, fair and valid way (Harden and Gleeson, 1979). In the past, the traditional understanding of medical education was dominated by the view that basic clinical skills were learned in clinical practice and therefore there was no need for a structured skills training in the training program. However, the increase in public expectations over the years and physicians feeling themselves deficient and insecure in various skills have created a serious concern in both students and newly graduated physicians. It has become widely accepted all over the world that the skills learned only in clinical practice are inadequate and that placing structured skills training in medical education programs from an early stage increases the sense of confidence in students and the chance and frequency of application in clinical practice. Objective, reliable, structured clinical exams were first developed in the 1970s in order to avoid the negative aspects of classical exams in the evaluation process, which constitutes an important part of structured skills training. As stated in many sources, OSCE was first introduced in medical education by Ronald Harden and colleagues in 1975. As stated in the literature, Harden felt that there was a risk of assessor bias in the process of assessing students and that this led to subjectivity in the assessment. Therefore, he designed the OSCE to eliminate the problems that negatively affect validity and reliability and to assess the clinical skills and competencies of senior medical students. It is reported in the literature that the OSCE was first used in 1977 at the University of Dundee in Scotland for examinations in the department of surgery, initially in a medical school in the UK, and later in North America, Canada, Australia and other western countries and all over the world. Over the years, OSCE has been widely used in medical education and other health professions including radiology, physiology and nursing. In the following years, the use of standardized patients in such examinations, which Howard Borrows introduced to medical education in 1963, increased the diversity and depth of the skills assessed.

OSCE focuses on the assessment of specific skills in controlled environments, which is the third step of the pyramid consisting of skill stages according to the developmental framework of clinical competence defined by Miller (1990) (Figure 2.2.).

2.2.2. Assessment of OSCE according to Miller's Pyramid for Clinical Evaluation: According to Miller's pyramid (Figure 2), when a person is at the lowest level of the pyramid, he/she "knows what it is", which corresponds to knowing the basic knowledge and concepts related to the subject, and at the upper level of the pyramid, he/she "knows how it is", which includes knowing how the normal-abnormal structure, mechanisms and functions are and adapting what is known to new situations. These two levels of the pyramid define the cognitive domain. The "knows" and "knows how" in the model allow for the assessment of the cognitive level through traditional written exams, assignments and projects. At the next level, which indicates the behavioral level, the person at the next level "shows how a job is done (demonstration of knowledge, skills and attitudes by applying them in an educational environment and under observation)" and at the highest level "does, applies (application of the profession in real life conditions)" steps include the evaluation of performance as well as knowledge. The cognitive and behavioral levels in the pyramid need to be evaluated with appropriate examination methods. At this level, oral exams, " OSCE" in English, direct observation, confidential standardized patient interviews, logbooks and portfolios are used to assess performance, and direct observation, confidential standardized patient interviews, logbooks and portfolios are used to assess behavior. However, in traditional education, classical exams to measure skills are conducted with a group of students either at the bedside or in the faculty members' rooms. The personal opinions and judgments of the lecturer about the student also play an important role in these unstructured exams. As can be seen, it is clear that such classical oral exams have the characteristics of fairness, validity and reliability that an exam should have, but their level is low and it is clear that all levels of the pyramid cannot be evaluated with a single assessment. For this purpose, a "mixed" method of assessment is needed. OSCE, whose main purpose is to assess the performance of clinical skills, provides a more objective and standardized education and assessment strategy, especially for the achievement of other desired learning outcomes, including clinical competencies, and to improve student responsibilities (Denat and Tuğrul, 2012).

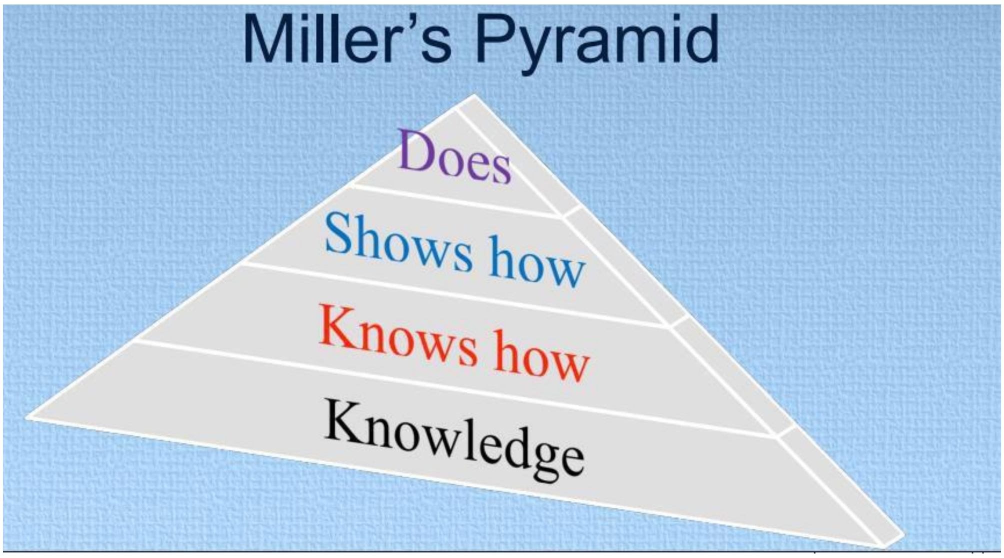


Figure 2. Miller Pyramid

2.2.3 OSCE's Uses, Advantages and Disadvantages: It is reported that OSCE supports the use of OSCE in various health sciences such as physical therapy, pharmacy and medicine, students get significantly higher scores from OSCE than other assessment methods and they prefer OSCE (Kassabry, 2023). In the literature, it is reported that OSCE supports the use of OSCE in various health sciences such as physical therapy, pharmacy and medicine, and that students score significantly higher on OSCE than other assessment methods and prefer OSCE (Awad, Ahmed, Alshamandy and Abolwafa, 2017; Jelly, and Sharma, 2017; Mohsen et. al., 2021). It is also stated that the OSCE method, unlike a traditional physical examination, can assess areas that are very important for the competence of a health professional, such as communication skills and the ability to deal with unexpected behaviors of the patient (Talwalker et. al., 2020)

Many academic institutions around the world such as the United States (Obizoba, 2018), China (Shen et. al.,2018; Sola-Pola et. al.,2020) and Australia have adopted the use of OSCE to assess clinical competence (Massey et. al.,2017), and many Arab countries such as Saudi Arabia (Entesar, 2019), United Arab Emirates (Fawaz and Alsalamah, 2021) use OSCE as an official method to assess practice competence in nursing clinical courses.

It is reported in the literature that OSCE is a good tool for measuring knowledge, attitudes and skills, and its use in health professional programs is increasing day by day because OSCE reflects the real-life clinical environment (Massey et. al.,2017; Sola-Pola et. al.,2020). OSCE is used in the evaluation of examination, intervention and communication skills before and after graduation, in various professional board examinations, and in the evaluation of clinical skills in various competency and board examinations in the United States and the United Kingdom. In Turkey, especially in the evaluation of pre-graduation skills, the general surgery, orthopedics and traumatology associations, the Psychiatric Association of Turkey and the Qualification Boards of the Ophthalmology Association of Turkey also use the OSCE as a practical test of competency assessment. OSCE exams are also organized and used in the fields of biostatistics and physiotherapy in our country and in the world. In the Akdeniz University Faculty of Medicine Education Program, it is stated that occupational skills are evaluated with OSCE in occupational skills training.

OSCE has been evaluated as a summative and formative assessment method in many studies (Bani- Issa, 2019; John, 2020; Mohsen et. al., 2022) and many researchers have confirmed that OSCE is a valid and reliable method (John, 2020; Yuan 2021). In addition, OSCE, which allows students to examine their strengths and weaknesses regarding clinical practice, gives students more opportunities to work (John, 2020; Fawaz and Alsalamah, 2021) and improves their self-evaluation (Sola-Pola, 2020)

Advantages

- Evaluation of all students on an equal footing
- Testing a large number of information at the same time
- Suitable for high level cognitive skills (synthesis, analysis, creativity)
- Ability to assess communication skills
- Ability to evaluate application skills
- Use of scenarios appropriate to the time flow

- Absence of unwanted clues
- Easier to structure than multiple choice
- Feedback and detailed analysis of performance is possible.

Disadvantages

- Requires planning
- Resource intensive (time, money and labor)
- It is necessary to create a test case and a scoring list.
- Create an equal testing environment
- It must be scored by hand.
- The examiners are relatively passive.
- Experienced trainers may not like this style.
- Experts usually do worse than beginners.
- Technical limitations (limited generalization)

2.2.4.OSCE Preparation Process, Implementation and Evaluation:

Preparation and planning of OSCEs, preparation of materials, and development of educators' knowledge and skills are the most important steps in the correct implementation of OSCE (Table 1.) (Chiou-Rong and Ue-Lin, 2015). Training of educators promotes objectivity and objectivity in student assessment, improves educators' competencies in student assessment and thus facilitates the reliability of OSCE results while ensuring that the results obtained from OSCE are fair and consistent (Fouad, Gouda, Abdel Nasser and Kamal, 2019).

Table 1. *OSCE implementation steps*

Determination and Evaluation of Learning Outcomes of the Course
Deciding to Implement OSCE
Deciding on the skills to be evaluated in the exam (Determines the number of stations in the exam)
Determining the Acceptable Time for Practicing Each Skill
Creation of Guidelines for Skills Assessment
Training of Educators to Take Part in the Examination (Use of Guides, Possible Student Behaviors, etc.)
Creating the Examination Organization
Review of the Examination System
Informing Students about the Examination System
Start of Examination

A systematic review examining the identification and management of the quality of OSCEs identified 22 quality measures that should be implemented in the three phases of OSCEs and have the potential to improve the overall quality of OSCE management. The study showed that the preparation and planning phase carries more weight in ensuring quality in the management of OSCEs, the implementation phase verifies the operability of the plan, and the evaluation phase provides opportunities for continuous quality assurance aimed at more robust design of future OSCEs (Nyangeni, Rooyen, Du Plessis and Ham-Baloyi, 2022).

Utilizing experts in OSCE drafting increases content validity by ensuring that relevant skills in all learning domains are assessed (Monti et. al., 2020). The planning phase of OSCEs is crucial for conducting successful, valid and reliable OSCEs and for establishing a solid foundation (Kolivand, Esfandyari, and Heydarpour, 2020). Having an organizing committee consisting of a knowledgeable and experienced OSCE coordinator is a precautionary measure in providing consultative support to examiners and assuring the quality of OSCEs (Goh, Tang, Devı, Ng And Lim, 2016). The committee should also provide oversight in the OSCE design and development process, the implementation and review of the OSCE program, the implementation of necessary quality assurance measures, the selection of examiners and standardized patients, the setting up of the OSCE, and the smooth conduct of the OSCE (Nyangeni, van Rooyen, Du Plessis, ten Ham-Baloyi, 2022)

Conducting OSCEs requires precise implementation of the OSCE plan based on prior preparation and planning. Conducting an evaluation after the OSCE implementation in terms of psychometric analysis and providing feedback improves the quality of OSCEs. The evaluation process should be used to make decisions about the validity of OSCEs and the reliability of their results. Evaluations provide an opportunity to identify shortcomings and implement remedial measures for future OSCEs.

Post-OSCEpsychometric analyses and feedback from students, examiners and standardized patients are necessary to identify station-specific difficulties (Ogunyemi and Dupras, 2017). Evaluations also facilitate the determination of the impact of OSCEs on learning and subsequent changes to the curriculum. Comparing the performance of students, evaluating the performance of assessors and standardized patients, reviewing the scoring rubric, and reviewing the station tasks should be addressed during evaluation (Arja et. al., 2018).

Briefly, in OSCE, students rotate between stations where they complete clinical activities based on predetermined scenarios (Fawaz and Alslamah, 2021) (Figure 3). Student evaluation based on checklists should be done within a maximum of 10 minutes at each station in order to realize the targeted clinical skills (Yuan, 2021).

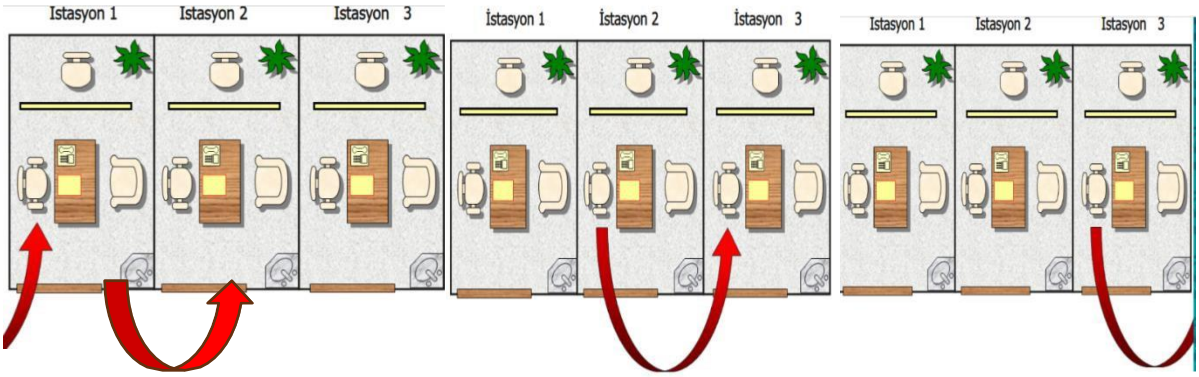


Figure 3. Station change image at OSCE

Educators ensure that students receive adequate training before the exam so that they are familiar with the OSCE procedure, follow each practical step of the method to the letter, and master the necessary skills (Kassabry, 2023). In order for the student to benefit from this practice and to increase the evaluation efficiency of OSCE, early planning and organization should be made, the educator should be ready to discuss the gains expected from the nursing student and to discuss the students' answers (Alsaid and Al-Sheikh, 2017).

2.3. Clinical Reasoning Examination (CORE)

In addition to OSCE, CORE can be used as another clinical assessment tool. CORE is a written examination consisting of stations that require the student to make decisions based on appropriate and basic domain knowledge at all stages of a patient's life from observation, care, treatment, follow-up and prevention. The CORE, also known as patient management problems, can be perceived as a formative method, a multiple-choice midterm exam or a part of a theoretical exam that tests students' reasoning skills and supports learning (Kaya, 2023; Şenol, Çubukçu, Alimoğlu, Gürpınar, 2004).

2.3.1. CORE Implementation Process: In CORE practice, the student is expected to take a detailed history taking into account the characteristics of the individual as they progress through the stations, make choices for physical examination, determine nursing diagnoses and appropriate interventions, and use their professional knowledge in this context (Kaya, 2023) with a written description of a clinical situation, setup or outline. At each station there is a written text/question describing the situation, written on a cardboard or paper, and a number of options. The student is asked to examine the details carefully and to decide whether or not to choose each of these options (Figure 4, Figure 5). When the learner turns over the cardboard with the option he/she prefers, he/she reads the feedback about his/her choice written on the back. There is no limit to the order or number of choices, and the student has the freedom to choose and open all the options available at the station. The student receives immediate feedback about his/her choices (Kaya, 2023).

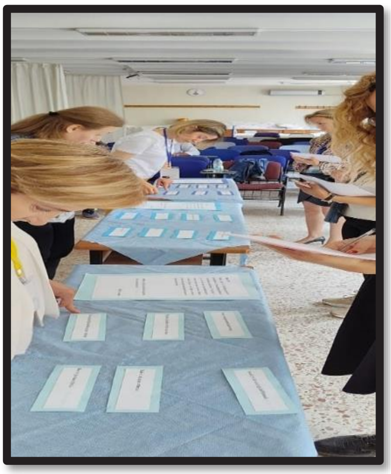


Figure 4. An Example of a station prepared according to the CORE plan

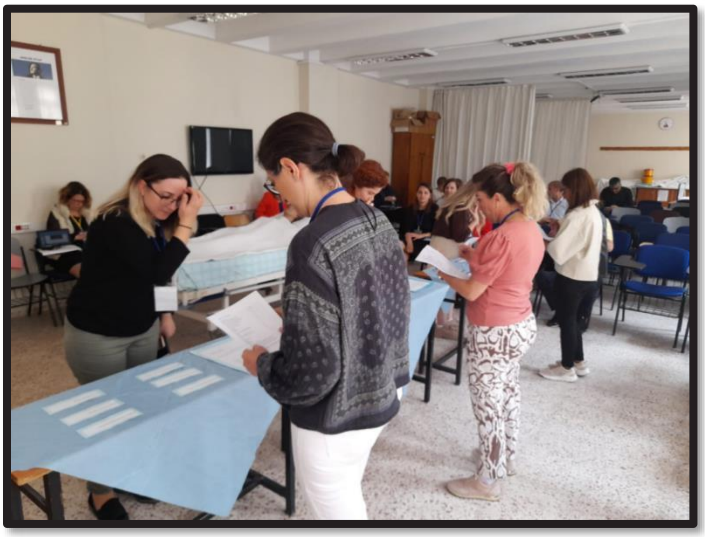


Figure 5. Instructor's evaluation of the student

The most important disadvantage of this exam, which has many advantages for students, is that it requires a serious labor-intensive preparation period. There may sometimes be problems in reaching a consensus on the case, the options and the appropriate score for each option (Şenol, Çubukçu, Alimoğlu, Gürpınar, 2004).

2.3.2. Use of OSCE-CORE in Measurement and Evaluation and the Results that can be Obtained:

In courses with OSCE-CORE as the assessment method, it is ensured that students demonstrate their professional knowledge, skills and attitudes by applying them in the educational environment and under observation, and demonstrate their performance to apply their profession in real life conditions. In this context, both the quality of assessment and evaluationincreases and changes in the desired direction occur in the preparation of students for the profession. The data obtained from the determination of realistic learning objectives and the evaluation of the objectives with reliable and appropriate assessment and evaluation tools constitute the most valuable evidence used in the evaluation of the education program. From this point of view, it is thought that the use of objective and structured clinical assessment and evaluation methods by instructors will contribute to the accreditation processes of the Nursing, Midwifery and Physical Therapy Rehabilitation Departments, Vocational School of Health Services and the Faculty of Medicine and will bring the programs to a stronger position.

With planned and practical trainings for the use of OSCE and CORE assessment methods, it will be ensured that instructors working in multidisciplinary groups in the field of health learn structured clinical exams in practice and evaluate students with structured, measurable and reliable criteria during clinical exams. Competent faculty members will contribute to the training of more qualified graduates by using structured clinical exams in student evaluation processes. In this context, it is also thought that in the long term, the quality of treatment and care of professionals who provide health services to the society will increase due to the fact that professionally self-confident, better equipped and qualified graduates will be brought into working life. In conclusion, assessment requires an evidence-based structuring between the learner and the trainer.

For this reason, the inclusion of students in the assessment-evaluation system, clear communication of what is expected of them, and the use of OSCE-CORE assessment methods in terms of accountability contribute to the evaluation of the student. As a facilitating factor in the educational process for students and trainers, it improves self-assessment skills, provides legal assurance by creating evidence, and reduces measurement and evaluation errors. By giving feedback to the student, the student will know exactly what is expected of him/her and complaints about assessment and evaluation will decrease and productivity will increase (Onay and İntepeler, 2023).

3. MATERIALS AND METHODS

3.1. Research Objective

This project was planned to ensure the use of structured clinical skills assessment exams in basing the measurement and evaluation processes of instructors working in the field of applied health education at our university on a valid and reliable process and to empower instructors in this regard**.**

3.2. Population and Sample of the Study

This research, which was conducted as a quasi-experimental pre-test-post-test intervention study without a control group, was conducted on a multidisciplinary group working in the faculties and colleges of Manisa Celal Bayar University that provide health education. In the study, it was planned that the maximum number of participants would be n=50 in order to ensure educational effectiveness (Hacıalioğlu, 2019). However, the instructors who could not fully participate in the theoretical and practical stages of the course program due to their educational activities were not included in the study (n=19). A total of 31 academic staff, including 24 from the Faculty of Health Sciences (Nursing n=20, Midwifery n=3, Physiotherapy and Rehabilitation n=1), 4 from the Faculty of Medicine and 3 from the Vocational School of Health Services, were included in the study.

3.3. Data Collection Tools and Methods

The study was conducted on May 31-June 1, 2023 at MCBÜ Faculty of Health Sciences. Before the training, a five-question "Participant Introduction Form" and a 10-question "OSCE Exam" and a 10-question "CORE Knowledge Test (Pre-test)", which were prepared by the trainers based on the literature to determine the level of knowledge on the subject and to evaluate the effectiveness of the training, were used, The participant introduction form and knowledge tests were prepared as online forms and asked to be completed by each participant.

The participants were trained by academicians from Akdeniz University Faculty of Nursing who are specialists in the field. After the training, OSCE and CORE Knowledge test (Post Test) were administered to the participants again. Participants (n=31) from multidisciplinary groups in the health field were evaluated on a total of 100 points by scoring each correct question they gave to the tests applied before and after the training. Mean scores from the tests were calculated. The results obtained from these tests were compared to determine the effectiveness of the training.

Approval was obtained from the MCBU Faculty of Medicine Health Sciences Ethics Committee. Prior to the study, the content, date and location of the course were announced by sharing the prepared poster with the instructors at the institutions.

In the first stage, the "Participant Introduction Form" and the "OSCE-CORE Knowledge Test (Pre-test)" prepared based on the literature as a pre-test were applied to the lecturers who wanted to participate in the study before the course program. For this purpose, this form prepared with Google forms was sent to the phones of the participants and they were asked to fill it out.

In Phase 2, the participants first received theoretical OSCE-CORE training (8 hours) in the Faculty of Health Sciences, Block B, Classroom 104. After the lecturing processes of the trainers were completed, group work was started. Participants were asked to prepare sample OSCE-CORE cases and the groups made presentations. In this interactive activity, both course trainers and participants provided feedback. Then, the next day, OSCE-CORE methods organized according to the conditions of the exam environment were demonstrated practically by the trainers in the Simulation Supported Nursing Skills Laboratory, which is actively used in the Faculty of Health Sciences. Each participant took part in the OSCE-CORE exam both as an evaluator and as an evaluated person.

In the final stage; after the completion of this process in which the participants took an active role, the OSCE-CORE knowledge test prepared with Google forms was applied as a post-test and the training process was completed by taking the feedback of the participants after the training.

3.4. Data Analysis

SPSS 25 program was used for data analysis. Number-percentage, significance test of the difference between two means were used in statistical evaluation. A value of $p<0.05$ was considered statistically significant. Shapiro-Wilk test was applied to evaluate whether the data were suitable for normal distribution. Since the data did not show normal distribution, non-parametric tests were used ($p<0.05$). Kuder-Richardson (KR-20) test was applied to evaluate the internal consistency of the OSCE and CORE Knowledge Tests used in the study. The KR-20 values of the OSCE and CORE knowledge tests are presented in Table 2. Among the measurement tools, the OSCE knowledge test KR-20 value was 0.724 and the CORE knowledge test KR-20 value was 0.806 (Table 2.).

Table 2. *KR-20 values of OSCE and CORE knowledge test*

Measurement Tools	**Test values**
OSCE Knowledge Test	0.724
CORE Knowledge Test	0.806

Ethical Approval of the Research

In this study, all rules specified in the "Directive on Scientific Research and Publication Ethics of Council of Higher Education Institutions" were followed. None of the actions specified under the second part of the Directive, "Actions Contrary to Scientific Research and Publication Ethics", have been carried out.

Ethics committee permission information: Name of the ethics review board: MCBU Faculty of Medicine Health Sciences Ethics Committee. Date ofethical assessment decision:12/04/2023. Ethics assessment certificate number number: 20.478.486/1793.

4. FINDINGS

Table 3. *Characteristics of participants* (n=31)

	n	%
Title		
Research Assistant	12	38.7
Assistant Prof.	6	19.5
Assoc. Dr.	11	35.5
Prof. Dr.	2	6.5
Worked unit		
Nursing	20	64.5
Midwifery	3	9.7
Physical Therapy and Rehabilitation	1	3.2
Faculty of Medicine	4	12.9
Vocational School of Health Services	3	9.7
Gender		
Female	26	83.9
Male	5	16.1
Previous OSCE-CORE training		
Yes	10	32.3
No	21	67.7
Previously using OSCE-CORE for skill assessment		
Yes	4	12.9
No	27	87.1
Total	31	100.0

Characteristics of the participants are presented in Table 3. Most of the participants were Research Assistant, female, working in the department of nursing, had not received any training on OSCE-CORE before and had not used OSCE-CORE in skill assessment processes before (Table 3).

Table 4. *Distribution of participants' responses to OSCE questions before and after training (n=31)*

	Pre test **n (%)**	**Post test** **n (%)**
It is a traditional oral examination method.		
Correct	17 (54.8)	23 (74.2)
Wrong	8 (25.8)	8 (25.8)
I don't know	6 (19.4)	0 (0.0)
Questions are randomly selected.		
Correct	4 (12.9)	15 (48.4)
Wrong	22 (71.0)	16 (51.6)
I don't know	5 (16.1)	0 (0.0)
Cost is an effective test.		
Correct	7 (22.6)	8 (25.8)
Wrong	16 (51.6)	23 (74.2)
I don't know	8 (25.8)	0 (0.0)
It is not a suitable method for crowded classes.		
Correct	9 (29.0)	15 (48.4)
Wrong	13 (42.0)	15 (48.4)
I don't know	9 (29.0)	1 (3.2)
Any number of stations can be opened for OSCE.		
Correct	6 (19.4)	15 (48.4)
Wrong	19 (61.3)	16 (51.6)
I don't know	6 (19.4)	0 (0.0)
It is an objective measurement method.		
Correct	25 (80.6)	29 (93.5)
Wrong	0 (0.0)	2 (6.5)
I don't know	6 (19.4)	0 (0.0)
It can also be done in the clinical field.		
Correct	25 (80.6)	21 (67.7)
Wrong	2 (6.5)	10 (32.3)
I don't know	4 (12.9)	0 (0.0)
It is an exam that assesses clinical skills.		
Correct	28 (90.3)	30 (96.8)
Wrong	0 (0.0)	1 (3.2)
I don't know	3 (9.7)	0 (0.0)
The standard patient can be used in OSCE.		
Correct	20 (64.5)	29 (93.5)
Wrong	2 (6.5)	2 (6.5)
I don't know	9 (29.0)	0 (0.0)
It is an exam that can be applied at every grade level.		
Correct	22 (71.0)	30 (96.8)
Wrong	4 (12.9)	1 (3.2)
I don't know	5 (16.1)	0 (0.0)
Total	31 (100.0)	31 (100.0)

Table 4 presents the distribution of the participants' responses to the questions about OSCE before and after the training. It was observed that the participants' correct answers to the statements "It is a traditional oral exam method.", "Questions are randomly selected.", "It is a cost-effective exam.", "It is not a suitable method for crowded classes.", "As many stations as desired can be opened for OSCE.", "It is an objective measurement method.", "It is an exam in which clinical skills are evaluated.", "Standard patients can be used in OSCE.", "It is an exam that can be applied at any grade level." increased after the training. The participants' correct answers to the statement "It can also be done in the clinical field" decreased after the training (Table 4).

Table 5. D*istribution of participants' responses to the questions related to the CORE before and after the training (n=31)*

	Pre test n (%)	**Post test n (%)**
Evaluation of clinical decision-making competence based on cases is done by patient approach problem assessment methods.		
Correct	25 (80.6)	29 (93.6)
Wrong	0 (0.0)	1 (3.2)
I don't know	6 (19.4)	1 (3.2)
CORE can be used both as a teaching and assessment tool.		
Correct	24 (77.4)	30 (96.8)
Wrong	0 (0.0)	1 (3.2)
I don't know	7 (22.6)	0 (0.0)
It consists of a scenario prepared based on a problem that the student may encounter in the real clinical environment.		
Correct	25 (80.6)	31 (100.0)
Wrong	0 (0.0)	0 (0.0)
I don't know	6 (19.4)	0 (0.0)
A table showing laboratory results, an image showing a clinical symptom can be added to the scenario.		
Correct	25 (80.6)	31 (100.0)
Wrong	1 (3.2)	0 (0.0)
I don't know	5 (16.1)	0 (0.0)
Each scenario deals with different cases and issues.		

Correct	2 (6.5)	19 (61.3)
Wrong	22 (71.0)	12 (38.7)
I don't know	7 (22.5)	0 (0.0)
The student is asked to choose the correct one among the options given, taking into account the problem defined.		
Correct	2 (6.5)	0 (0.0)
Wrong	21 (67.7)	30 (96.8)
I don't know	8 (25.8)	1 (3.2)
Each of the given options has a different point weighting.		
Correct	16 (51.6)	30 (96.8)
Wrong	1 (3.2)	1 (3.2)
I don't know	14 (45.2)	0 (0.0)
The CORE construct is a multiple-choice exam.		
Correct	7 (22.6)	14 (45.2)
Wrong	12 (38.7)	17 (54.8)
I don't know	12 (38.7)	0 (0.0)
During the CORE application, the student receives immediate feedback (whether his/her answer is correct or incorrect).		
Correct	17 (54.8)	30 (96.8)
Wrong	4 (12.9)	1 (3.2)
I don't know	10 (32.3)	0 (0.0)
CORE is a time-efficient test method with easy preparation and implementation phases.		
Correct	2 (6.5)	5 (16.1)
Wrong	20 (64.5)	26 (83.9)
I don't know	9 (29.0)	0
Total	31 (100.0)	31 (100.0)

Table 5 presents the distribution of the participants' responses to the questions related to the clinical reasoning test (CORE) before and after the training. Regarding the CORE, the participants stated: "Evaluation of clinical decision-making competence based on cases is done with Patient Approach Problem Assessment methods.", "CORE can be used both as a teaching and assessment tool.", "It consists of a scenario prepared based on a problem that the student may encounter in the real clinical environment.", "A table showing laboratory results can be added to the scenario, an image showing a clinical symptom. ", "Different cases and problems are addressed in each scenario.", "Each of the given options has a different point weight.", "The CORE setup is a multiple-choice exam.", "During the CORE application, the student receives immediate feedback." and "CORE is an exam method whose preparation and implementation stages are easy and time can be used effectively." It was observed that the correct answers to the statements increased after the training. The participants' correct answers to the statement "The student is asked to choose the correct one among the options given by considering the problem defined." decreased after the training (Table 5).

Table 6. C*omparison of participants' OSCE and CORE knowledge scores before and after training (n=31)*

	Pre-test			**Post-test**				
	Mean±SD	**Median**	**I.Q.R.**	**Mean±SD**	**Median**	**I.Q.R.**	**Z***	**p**
OSCE knowledge test	52.58±22.65	60.00	20.00	69.35±12.89	70.00	20.00	-3.194	**0.001**
CORE knowledge test	46.77±23.71	60.00	20.00	70.64±10.93	70.00	20.00	-4.390	**0.000**

Mean±SD: Mean ± standard deviation. **I.Q.R.**: Interquartile range

*Z: Wilcoxon signed ranks test.

When the OSCE knowledge test and CORE knowledge test pre-test - post-test median score values of the participants after the training were compared, it was seen that both OSCE (p=0.001) and CORE (p=0.000) knowledge test median score values increased after the training and the difference was statistically significant (p<0.05, Table 6).

Table 7. *Participants' feedback after the training*

	n (%)
The duration of the training should have been longer. 20 (64.5) **It was valuable**	
for the trainers to share their lived experiences 24 (77.4) **It was a productive**	
training. 28 (90.3)	
The program content was comprehensive. 16 (51.6)	
Practical demonstration of CORE in laboratory environment was very useful.	20 (64.5)
Practical demonstration of OSCE could also be done. 12 (38.7)	

* Each participant answered more than once.

Feedback was received from the participants after the training. 90.3% of the participants reported that the training was productive, 77.4% said that it was important for the trainers to share their experiences with OSCE-CORE, 64.5% said that the practical demonstration of OSCE in the laboratory environment was very useful, 64.5% said that the duration of the training should be longer, 51.6% said that the content of the training was comprehensive, and 38.7% said that the practical demonstration of CORE could also be done (Table 7.).

5. DISCUSSION

In order to carry out the educational services carried out in universities more effectively, it is thought that educators should develop themselves in terms of education in a way to adapt to the requirements and innovations of the age in order to graduate students who can increase their professional development and professional competencies, adapt to change and internalize lifelong learning. For this reason, the importance of training of trainers programs, which is a program that can be evaluated among lifelong education activities, emerges in universities as in every institution (Kıyak, 2019; Tekerek and Sağır,2020).

As in every field of education, it is necessary to evaluate behavioral learning and psychomotor skills as well as cognitive learning in nursing education. The preferred exams for measuring skills should be structured. Structured clinical exams are very important in order to provide better quality patient care and objective evaluation. In the studies, the importance, benefits and objective evaluation method of OSCE, which is one of the structured clinical skills assessment exams, are stated.

It has been reported that using OSCE in nursing students contributes to the development of students' clinical skills, provides positive perspectives to increase their self-confidence in their knowledge, and the majority of students are satisfied with the objective structured clinical examination approach (Bani- Issa et.al., 2019; Entesar, 2019; John, 2020; Kassabry, 2023; Mohsen et. al., 2021).

In a study conducted with 207 nursing students in Korea, it was stated that objective structured clinical examinations (OSCE) improve the retention of nursing students' knowledge after courses and basic nursing skill practices, and therefore, OSCE application can strengthen and positively affect the knowledge level and clinical competence of nursing students (Ha and Lim, 2023)

Raurell-Torreda et al. (2018) found that the mean OSCE score was 5.6 ±1.2 and 7.5% of students failed, while the mean score in the final practice was 8.4 ±0.6 and there were no failed students; there was a strong correlation between the mean OSCE and practical practice scores (Raurell-Torredà et. al., 2018)

In the study by Soni et al. (2017) comparing the classical method with the OSCE method, it was determined that the mean skill score of the students in the OSCE group was higher (Soni, Rani, Thokchom, Sarkar, 2017). Khadiga and Safa (2020) and Edward and Okanlawon (2016) stated that OSCE is more objective than classical evaluation methods (Edward and Okanlawon, 2016; Said and Draz, 2020). In a study examining the attitudes of nursing faculty members towards OSCE, 80% of the faculty members stated that OSCE is an objective method for evaluating clinical competence, 90% stated that it is a transparent, unbiased and fair exam, and 70% stated that it helps students develop confidence to apply what is taught (Omu, 2016).

In our country, it is seen that the use of OSCE in the field of health has found a very important place. The practical training of educators on this evaluation system ensures the usability of the methods in undergraduate education and increases the quality of education. With this in mind, the aim of this study was to increase the knowledge and skills of health educators about the application of OSCE and CORE exams and their use in evaluation processes, which is a part of quality education.

According to the results of the study we conducted for this reason; it was observed that the correct answers given by almost all of the participants to the questions related to the OSCE and CORE exams increased after the training, while the correct answers given to the statement "It can also be done in the clinical field." related to OSCE and the statement "The student is asked to choose the correct one among the options given by considering the problem defined." related to CORE decreased after the training. It was found that the mean OSCE Knowledge Test score increased from 52.58 to 69.35 and the mean CORE knowledge score increased from 46.77 to 70.64 and there was a statistically significant difference between them. It can be said that the training positively affected their knowledge levels.

When the feedback received from the participants after the training was analyzed; 90.3% stated that the training was efficient, 77.4% stated that it was important for the trainers to share their experiences related to OSCE-CORE, 64.5% stated that the practical demonstration of OSCE in the laboratory environment was very useful, 64.5% stated that the training period should be longer, 51.6% stated that the training content was comprehensive, 38.7% stated that the practical demonstration of CORE could also be done.

The use of structured clinical exams in the field of health sciences is very important in order to provide objective evaluations, to train more competent students and to provide better quality patient care. In this context, obtaining educators' feedback on such assessment and evaluation methods will give an idea about the acceptability and applicability of the method. In this study, the fact that the instructors who received OSCE-CORE training stated that OSCE is an objective measurement method and an exam in which clinical skills are evaluated, that they are satisfied with the program content and that it is an efficient training may suggest that they may have a positive opinion about OSCE-CORE applications.

Similarly, in a study in which OSCE was evaluated by educators; 87.5% strongly agreed with the statements "The exam instructions were clear" and "The exam gave me the information I needed", 80% strongly disagreed with the statement "I did not get answers to my questions to my satisfaction", 97. 3% disagreed, 90% strongly agreed with the statement "The exam could have been better organized", 82.5% strongly agreed with the statement "OSCE tests the knowledge required for practice", 62.5% agreed with the statement "The skills required for the course were adequately tested", 50% agreed with the statement "The attitudes required for practice are tested", 72.5% strongly agreed with the statement "The exam questions were clearly written" (Bani-Issa et., al., 2019).

In the study conducted by Fawaz and Alsalamah (2021), 83.3% strongly agreed with the statement "The exam instructions were clear", 83.3% disagreed with the statement "I did not get answers to my questions to my satisfaction", 88.9% strongly agreed with the statement "The exam gave me the information I needed", and 100% agreed with the statement "I still had unanswered questions after the exam", 0% strongly disagreed, 83.3% strongly disagreed with the statement The exam could have been better organized", 100.0% strongly agreed with the statements "OSCE tests the knowledge required for practice", "The skills required for the course are adequately tested", "The attitudes required for practice are tested" and "The exam questions were clearly written" (Fawaz and Alsalamah, 2021). In our study, almost all of the trainers reported that OSCE is an objective measurement method and an exam that evaluates clinical skills, more than half of them reported that the content of the training was comprehensive, and almost all of them reported that the training was efficient. When the literature on the subject was examined; trainers stated that OSCE is a useful and unbiased, objective form of examination, early planning and better organization are needed for a more effective evaluation (Bani-Issa et., al., 2019; Fawaz and Alsalamah, 2021).

6. CONCLUSIONS AND RECOMMENDATIONS

OSCE- CORE is a process in which students' professional skill levels are assessed by field experts using standardized scales and objective and structured methods. There is no room for error in the working life of professionals in the field of health, whose focus is on people and who produce solutions to people's health-related problems in their weakest and weakest moments. For this reason, institutions and instructors responsible for the education of these groups should train well-equipped and qualified graduates. In this respect, training programs organized for instructors on OSCE and CORE, which are important tools for the appropriate measurement and evaluation of students' professional competencies, are very important.

In this section, conclusions and recommendations were made regarding the effectiveness of the OSCE and CORE training program applied to individuals working as instructors in Manisa Celal Bayar University applied health units.

- It was observed that the correct answers of the participants to all of the propositions except the proposition "OSCE can also be done in the clinical field" increased after the training.
- It was observed that the participants' correct answers to all of the other propositions increased after the training, except for the proposition "The student is asked to choose the correct one among the options given, taking into account the problem defined."
- When the OSCE knowledge test and CORE knowledge test pre-test - post-test median score values of the participants after the training were compared, it was seen that both OSCE and CORE knowledge test median score values increased significantly after the training.
- It was observed that the feedback of the participants about the training was generally positive and that they requested long-term and comprehensive trainings on the subject.

In line with the findings of this research, recommendations are presented below:

- Implementation of practical and theoretical training programs for OSCE-CORE in our university, especially for all academic staff involved in the training processes of health professionals,

- Making the application areas and laboratories of the faculties physically suitable for the easy implementation of OSCE and CORE,
- The implementation of OSCE-CORE by trainers in training,
- It is recommended that training effectiveness evaluation studies on the applicability of OSCE-CORE be conducted in larger sample groups.

REFERENCES

Akın Korhan, E., Tokem, Y., Uzelli Yılmaz, D., Dilemek, H. (2016). Hemşirelikte psikomotor beceri eğitiminde video destekli öğretim ve OSCE uygulaması: Bir deneyim paylaşımı. *İzmir Katip Çelebi Üniversitesi Sağlık Bilimleri Fakültesi Dergisi*, 1(1), 35-37.

Alsaid, A. H., & Al-Sheikh, M. (2017). Student and faculty perception of objective structured clinical examination: A teaching hospital experience. *Saudi journal of medicine & medical sciences*, *5*(1), 49-55.

Arja, S. B., Arja, S. B., Ramey, J., Ahmed, T. F. A., Ponnusamy, K., & Morusupalli, V. R. (2018). Logistics behind the OSCE in undergraduate medical education and an experience at a Caribbean Medical School. *MedEdPublish*, *7*, 233.

Awad, L. A., Ahmed, S., Alshamandy, A. A., & Abolwafa, N. F. (2017). Perception of undergraduate nursing students towards objective structured clinical examination (OSCE). *IOSR Journal of Nursing and Health Science Ver*, *7*(6), 5.

Bani-Issa, W., Al Tamimi, M., Fakhry, R., & Al Tawil, H. (2019). Experiences of nursing students and examiners with the Objective Structured Clinical Examination method in physical assessment education: A mixed methods study. *Nurse Education in practice*, *35*, 83-89.

Buluta, Ġ., Sapancı, A., & Karac, Ġ. H. (2015). Tıp eğitiminde kullanılan ölçme ve değerlendirme araçlarının geleneksel ve alternatif ölçme ve değerlendirme araçları olarak sınıflandırılması. *Journal of Medical Education And Informatics*, *1*(1), 2-11.

Chiou-Rong, H., & Ue-Lin, C. (2015). Objective structured clinical examinations have become a challenge for nursing education in Taiwan. *Annals of Nursing Practice*, *2*, 1-2.

Denat, Y., & Tugrul, E. (2012). A method for evaluating clinical skills performance: the objective structured clinical examination. *Journal of Education and Research in Nursing*, *9*(3), 53-60.

Divya, K. Y., Valsaraj, B. P., Qutishat, M. G., & Al Abri, K. R. S. (2019). Planning and ımplementing Objective Structured Clinical Examination (OSCE) as a clinical examination method in mental health nursing: Perceptions of undergraduate nursing students in Oman; a pilot study. *International Journal of Nursing Education*, *11*(4), 186-190.

Edward, M. I., & Okanlawon, F. (2016). Perception of objective structured clinical examination and traditional practical examination in assessment of nursing students clinical competencies by nursing students in south west Nigeria. *International Journal of Medical Research and Review*, *4*(8), 1340-1350.

Makhlouf, E. (2019). Saudi nursing students' outcomes and perspectives about an objective structured clinical examination in obstetrics and gynecological nursing course. *Health Sci*, *8*(3), 19-25.

Fawaz, M., & Alsalamah, Y. (2021). Perceptions of Lebanese nursing students and examiners regarding the Objective Structured Clinical Examination Method (OSCE) in nursing fundamentals: A mixed method study. *International Journal of Africa Nursing Sciences*, *15*, 100373.

Fouad, S., Gouda, E., Nasser, A. A., & Kamal, D. (2019). Perception of students, staff and simulated patients towards Objective

Structured Clinical Examination (OSCE). *Education in Medicine Journal*, *11*(2).

Goh, H. S., Tang, M. L., Devı, M. K., Ng, K. C. E., & Lım, L. M. (2016). Testing the psychometric properties of Objective Structured Clinical Examination (OSCE) in nursing education in Singapore. *Singapore Nursing Journal*, *43*(1).

Ha, E. H., & Lim, E. (2023). The effect of objective structured clinical examinations for nursing students. *PLoS One*, *18*(6), e0286787.

Hacıalioğlu, N. (2019). *Hemşirelikte öğretim öğrenme ve eğitim*. (5th Ed). İstanbul: Nobel Tıp Kitabevleri.

Hanshaw, S. L., & Dickerson, S. S. (2020). High fidelity simulation evaluation studies in nursing education: A review of the literature. *Nurse Education in Practice*, *46*, 102818.

Harden, R. M., & Gleeson, F. A. (1979). Assessment of clinical competence using an objective structured clinical examination (OSCE). *Medical education*, *13*(1), 39-54.

HUÇEP, *Hemşirelik Ulusal Çekirdek Eğitim Programı* (2022). Retrieved from: https://www.hemed.org.tr/wpcontent/uploads/2023/10/hemsirelik_cekirdek_egitim_programi.pdf on. the 30.10.2023.

Jelly, P., & Sharma, R. (2017). OSCE vs. TEM: Different approaches to assess clinical skills of nursing students. *Iranian journal of nursing and midwifery research*, *22*(1), 78-80.

John, B. (2020). Exploring nursing students experience with objective structured clinical examination (OSCE) as an assessment tool: A mixed methods research. *JRL J Sci Technol*, 2(1), 1-10.

Kassabry, M. F. (2023). Evaluation of simulation using objective structured clinical examination (OSCE) among undergraduate nursing students: A systematic review. *International Journal of Africa Nursing Sciences*, *18*, 100553.

Kaya, N. (March 11, 2022). *Objektif Yapılandırılmış Klinik Sınavlar*. Retrieved from: https://bezmialem.edu.tr/saglik-bilimleri fakultesi/PublishingImages/Lists/Haber%20Duyurular/YeniForm/objektif-yapilandirilmis-klinik-sinavlar.pdf. on.the 15.10.2023.

Kıyak,Y.S., (2019, October 4). *Eğitici iEğitimi*. Retrieved from https://www.academia.edu/40834237/E%C4%9Fitici_E%C4%9Fitimi_Faculty_Development_T%C4%B1p_E%C4%9Fitimi . on.the 12.10.2023.

Kolivand, M., Esfandyari, M., & Heydarpour, S. (2020). Examining validity and reliability of objective structured clinical examination for evaluation of clinical skills of midwifery undergraduate students: a descriptive study. *BMC Medical Education*, *20*, 1-7.

Massey, D., Byrne, J., Higgins, N., Weeks, B., Shuker, M. A., Coyne, E., ... & Johnston, A. N. B. (2017). Enhancing OSCE preparedness with video exemplars in undergraduate nursing students. A mixed method study. *Nurse Education Today*, *54*, 56-61.

Memon, S. (2020). Comparison of performance on written and OSCE assessment during end semester pediatric examination. *Pakistan Journal of Medical Sciences*, *36*(4), 711.

Mohsen, M. M., Elzyen, E. S., Riad, N. A., & El-Abbassy, A. A. (2021). Efficacy of using objective structured clinical examination on competencies of nursing students in health assessment skill. *Journal of Applied Health Sciences and Medicine*, *1*(1), 54-68.

Monti, M., Klöckner-Cronauer, C., Hautz, S. C., Schnabel, K. P., Breckwoldt, J., Junod-Perron, N., ... & Huwendiek, S. (2020).

Improving the assessment of communication competencies in a national licensing OSCE: lessons learned from an experts' symposium. *BMC medical education*, *20*, 1-7.

Nyangeni, T., van Rooyen, D. R., Du Plessis, A. H., & ten Ham-Baloyi, W. (2022). Quality management of objective structured clinical examinations: an integrative literature review. *Nurse Education Today*, *109*, 105223.

Obizoba, C. (2018). Mitigating the challenges of objective structured clinical examination (OSCE) in nursing education: A phenomenological research study. *Nurse education today*, *68*, 71-74.

Ogunyemi, D., & Dupras, D. (2017). Does an objective structured clinical examination fit your Assessment Toolbox?. *Journal of graduate medical education*, *9*(6), 771-772.

Omu, F. E. (2016). Attitudes of nursing faculty members and graduates towards the objective structured clinical examination (OSCE). *Open Journal of Nursing*, *6*(5), 353-364.

Onay, T., & İntepeler, Ş. S. (2023). Rubrik ile ödev ve performans değerlendirme: sürekli iyileştirme örneği. *Sağlık Bilimleri Üniversitesi Hemşirelik Dergisi*, *5*(1), 55-60.

Özden, D., Arslan, G. G., Ertuğrul, B., & Adanır, A. (2022). Hemşirelik öğrencilerinin objektif yapılandırılmış klinik sınav becerisinin teorik ve uygulama başarısı ile ilişkisi. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, *15*(4), 487-506.

Preston, R., Gratani, M., Owens, K., Roche, P., Zimanyi, M., & Malau-Aduli, B. (2019). Exploring the ımpact of assessment on medical students' learning. *Assessment & Evaluation in Higher*

Education, *45*(1), 109–124. https://doi.org/10.1080/02602938.2019.1614145

Raurell-Torredà, M., Romero-Collado, À., Bonmatí-Tomàs, A., Olivet-Pujol, J., Baltasar-Bagué, A., Sola-Pola, M., & Mateu-Figueras, G. (2018). Objective structured clinical examination: An assessment method for academic-practice partnerships. *Clinical Simulation in Nursing*, *19*, 8-16.

Said, K. M., & Draz, S. F. (2020). Traditional versus objective structured clinical examination on pediatric nursing students' performance. *Evidence-Based Nursing Research*, *2*(1), 11-11.

Sam, G. O. H. (2017). The Use of OSCE to Predict the Future Work Performance of Singapore Nursing Students. *GSTF Journal of Nursing and Health Care (JNHC)*, *4*(2).

Shen, L., Zeng, H., Jin, X., Yang, J., Shang, S., & Zhang, Y. (2018). An innovative evaluation in fundamental nursing curriculum for novice nursing students: an observational research. *Journal of Professional Nursing*, *34*(5), 412-416.

Solà-Pola, M., Morin-Fraile, V., Fabrellas-Padrés, N., Raurell-Torreda, M., Guanter-Peris, L., Guix-Comellas, E., & Pulpón-Segura, A. M. (2020). The usefulness and acceptance of the OSCE in nursing schools. *Nurse education in practice*, *43*, 102736. Advance online publication. https://doi.org/10.1016/j.nepr.2020.102736

Soni, R., Rani, S., Thokchom, S., & Sarkar, S. (2017). A comparative study to assess the opinion and level of satisfaction of the student nurses regarding objective structured clinical examination (OSCE) and Traditional Method of Clinical Skills Assessment related to Antenatal Examination. *Int J Nurs Midwif Res*, *4*(2), 9-12.

Stanley, D., Coman, S., Murdoch, D., & Stanley, K. (2020). Writing exceptional (specific, student and criterion-focused) rubrics for nursing studies. *Nurse education in practice*, *49*, 102851.

Şenol, Y., Çubukçu, S., Alimoğlu, K., & Gürpınar, E. (2004). Akdeniz Üniversitesi Tıp Fakültesinde bir değerlendirme uygulaması: Hasta yönetim problemleri. *Tıp Eğitimi Dünyası*, *15*(15).

Şenyuva, E., & Şen, Y. (2023). Hemşirelik eğitiminde kullanılan performans değerlendirme araçları: dereceli puanlama anahtarları ve kontrol listeleri: Geleneksel derleme. *Turkiye Klinikleri J Nurs Sci*, *15*(1), 263-74.

Talwalkar, J. S., Murtha, T. D., Prozora, S., Fortin, A. H., Morrison, L. J., & Ellman, M. S. (2020). Assessing advanced communication skills via objective structured clinical examination: a comparison of faculty versus self, peer, and standardized patient assessors. *Teaching and Learning in Medicine*, *32*(3), 294-307.

Tekerek, M. & Sağır, M. (2020). Yükseköğretimde eğiticilerin eğitimi. (1st Ed.).Ankara: PEGEM AKADEMİ.

UÇEP, (2020). *Mezuniyet Öncesi Tıp Eğitimi Ulusal Çekirdek Eğitim Programı* 2020 Retrived from: https://www.yok.gov.tr/Documents/Kurumsal/egitim_ogretim_dairesi/Ulusal-cekirdek-egitimi-programlari/mezuniyet-oncesi-tip-egitimi-cekirdek-egitimi-programi.pdf on. the 30.10.2023.

Yuan, H. B. (2021). Evaluation of undergraduate students' nursing assessment and communication skills through an objective structured clinical examination within a high-fidelity simulation using a student-simulated patient. *Frontiers of Nursing*, *8*(2), 159-168.

A RARE SYNDROME: ARTERIAL CALCIFICATION IN INFANCY (GACI) AND NURSING CARE

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Chapter 3

A Rare Syndrome: Arterial Calcification in Infancy (Gacı) And Nursing Care

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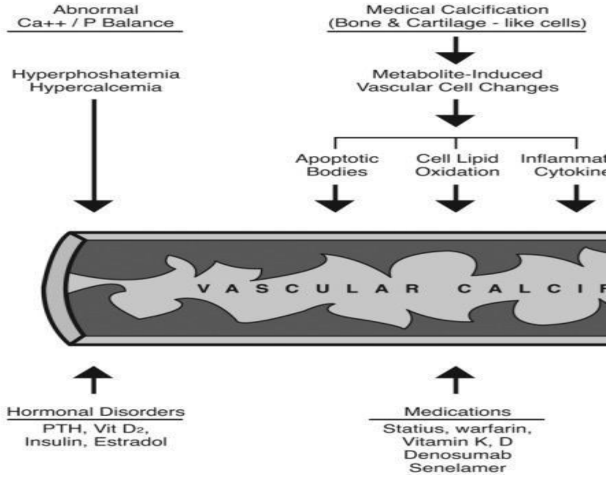
INTRODUCTION

Calcification is the deposition of calcium mineral in various tissues, organs and vessels in the body. Pathologically, it starts as microcalcifications (0.5 to 15.0 µm) and then develops into larger calcium particles. Eventually it results in sheet-like deposits (>3 mm). Calcium is an important ion in many metabolic processes, including heart rate and contraction, neuronal activity and the endocrine system. Although calcium is mainly stored in bones and teeth, it can also accumulate in various organs such as the spleen, liver, kidney and circulatory system. Its accumulation in organs and vessels may eventually lead to obstructive atherosclerosis. Figure 1 shows the pathophysiology of intravascular calcification.


Abnormal Ca++ / P Balance
Medical Calcification (Bone & Cartilage - like cells)
Hyperphoshatemia Hypercalcemia
Metabolite-Induced Vascular Cell Changes
Apoptotic Bodies
Cell Lipid Oxidation
Inflammat Cytokin
V A S C U L A R C A L C I
Hormonal Disorders
PTH, Vit D2, Insulin, Estradol
Medications
Statius, warfarin, Vitamin K, D Denosumab Senelamer

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Source:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4262070/figure/fig01/

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Artery Calcification

Arteries are relatively large arteries that carry blood from the heart to the organs. Calcification of the arteries begins at a very young age. It is only recognised at the age of 40. Arterial calcification becomes more severe with age. According to studies, it has been reported that more than two thirds of patients over the age of 70 have calcification in all vascular beds examined. Age and hypertension are the most important risk factors for systemic calcific atherosclerosis. Over 70 years of age, 90% of men and 67% of women have coronary artery calcification. Calcification in the coronary arteries narrows the diameter of these vessels and reduces the amount of blood passing through the vessel. In this case, the coronary arteries responsible for feeding the heart cannot fully fulfil their function. As a result, health problems such as coronary artery disease and heart attack may occur in these people. Conditions that cause arterial calcification include metabolic syndrome, smoking, obesity, high cholesterol, diabetes, high blood pressure, low HDL and chronic kidney disease. There is no specific treatment for arterial calcification. The main aim of treatment is to reduce the risk of cardiovascular disease that may develop due to narrowing of the vessel diameter. For this purpose, patients' underlying conditions such as diabetes, blood pressure and high cholesterol should be controlled.

What is Arterial Calcification of Infancy (Gacı)?

Description

Arterial calcification of infancy (GACI) is a disease affecting the circulatory system that becomes apparent before birth or within a few months after birth. It is characterised by an abnormal deposition (calcification) of the mineral calcium in the walls of the vessels (arteries) that carry blood from the heart to other parts of the body.

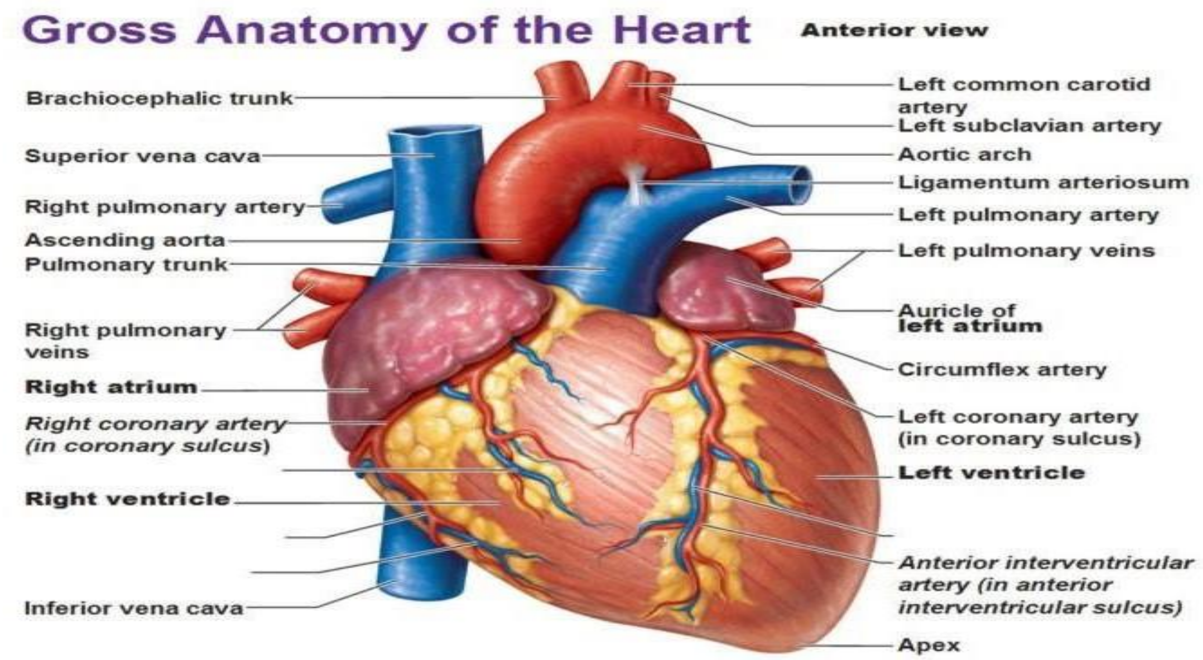


Figure 2: Anatomy of the heart

Source: https://kalpritmi.com/kalp-anatomisi.html#Kalbin_Anatomisi_ve_Fizyolojisi

Calcification is often caused by thickening of the lining (inner membrane) of the arterial walls. These changes lead to narrowing of the arteries (stenosis) and arteriosclerosis, which forces the heart to work harder to pump blood. As a result, affected babies may develop signs and symptoms such as heart failure, difficulty breathing, oedema of the hands and feet, cyanosis of the skin and lips, hypertension and cardiomegaly.

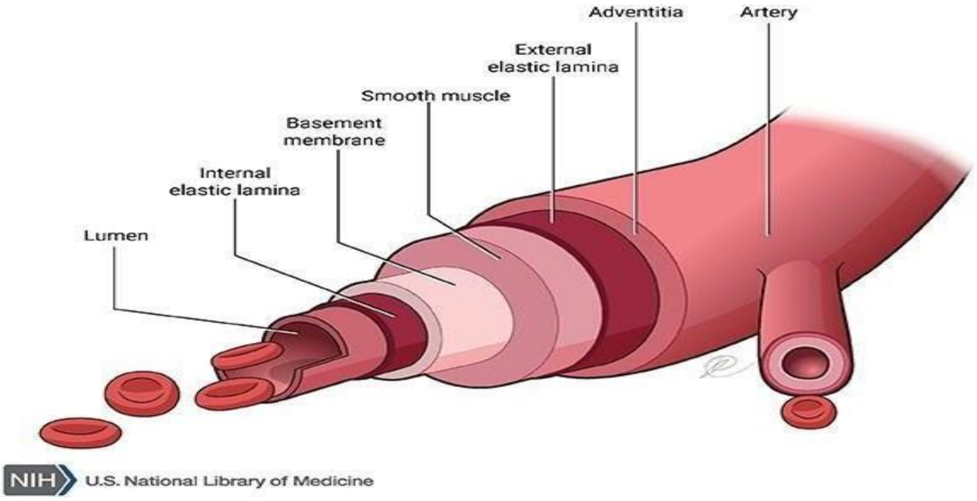


Figure 3: Vascular anatomy

Source: https://www.molekulce.com/bebeklik-donemi-arteriyel-kalsifikasyonu/

Diffuse arterial calcification of infancy (GACI) is a rare genetic disorder.

Frequency of Occurrence

It occurs in approximately 1:200,000 pregnancies. The carrier rate is 1:223. GACI affects men and women equally and occurs worldwide regardless of ethnicity or race.

Causes of the disease

In approximately 2/3 of cases, GACI is caused by mutations in the *ENPP1* gene. This gene provides instructions for making a protein called adenosine triphosphate (ATP), which helps break down ATP, especially when it is found outside the cell (extracellular). Extracellular ATP can be easily broken down into molecules called adenosine monophosphate (AMP) and pyrophosphate. Pyrophosphate is important in controlling calcification and other mineralisation in the body. Mutations in the *ENPP1* gene are thought to cause reduced availability of pyrophosphate, excessive calcification in the body and the signs and symptoms of GACI.

GACI (Arterial Calcification of Infancy) can also be caused by mutations in the *ABCC6* gene. This gene provides instructions for making a protein called MRP6, also known as the ABCC6 protein. This protein is found primarily in the liver and kidneys, with small amounts found in other tissues such as the skin, abdomen, blood vessels and eyes.

MRP6 protein is thought to transport certain substances across the cell membrane, but these substances have not yet been identified. Some studies suggest that MRP6 protein stimulates the release of ATP from cells by an unknown mechanism, allowing ATP to be broken down into AMP and pyrophosphate and helping to store calcium and other minerals in the body, as described above.

Other studies suggest that a substance carried by MRP6 is involved in ATP breakdown. This unidentified substance is thought to help prevent calcification of tissues.

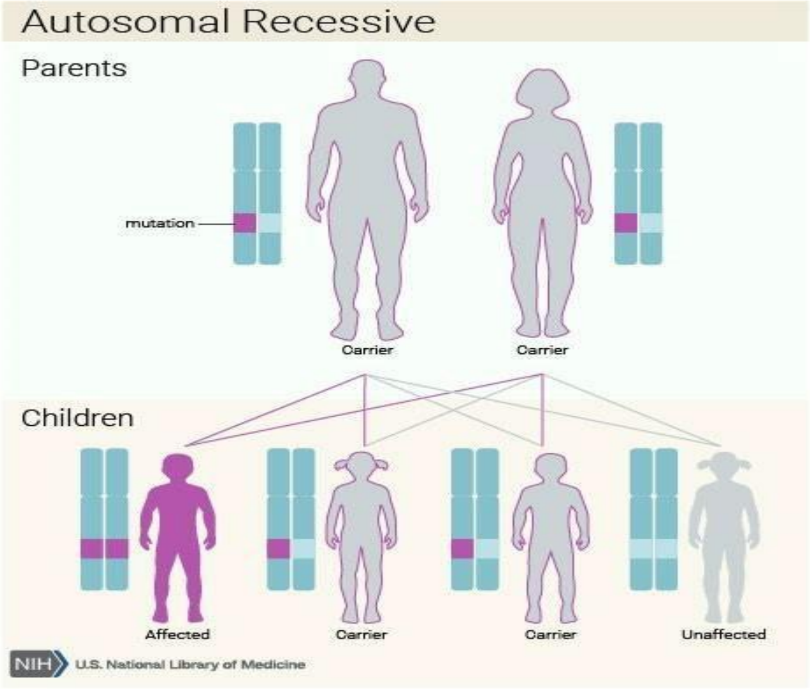
Mutations in the *ABCC6* gene result in a missing or dysfunctional MRP6 protein. It is unclear how the absence of a properly functioning MRP6 protein causes GACI (Arterial Calcification of Infancy). This deficiency may impair the release of ATP from cells. As a result, less pyrophosphate is produced and calcium is deposited in blood vessels and other tissues affected by GACI. Alternatively, functional MRP6 deficiency may impair the transport of a substance that would normally prevent mineralisation, resulting in the abnormal calcium deposition characteristic of GACI.

Some individuals diagnosed with GACI in infancy or who live into adulthood do not have mutations in the *ENPP1* and *ABCC6* genes. The cause of the disease in these individuals is unknown.

It has an autosomal recessive inheritance pattern. It is caused by inactivation of variants in genes encoding ENPP1 or, in a minority (9-10%), ABCC6. GACI type 1, seen in 75% of cases, is caused by mutations in the ENPP1 gene, while GACI type 2 is caused by mutations in the ABCC6 gene, seen in 10% of cases. Mutations in these genes result in reduced levels of endogenous inhibitors of bone mineralisation, leading to ectopic mineralisation of arteries and other tissues. Diffuse calcification of large and medium-sized arteries is usually present in the neonatal period.

Inheritance Model

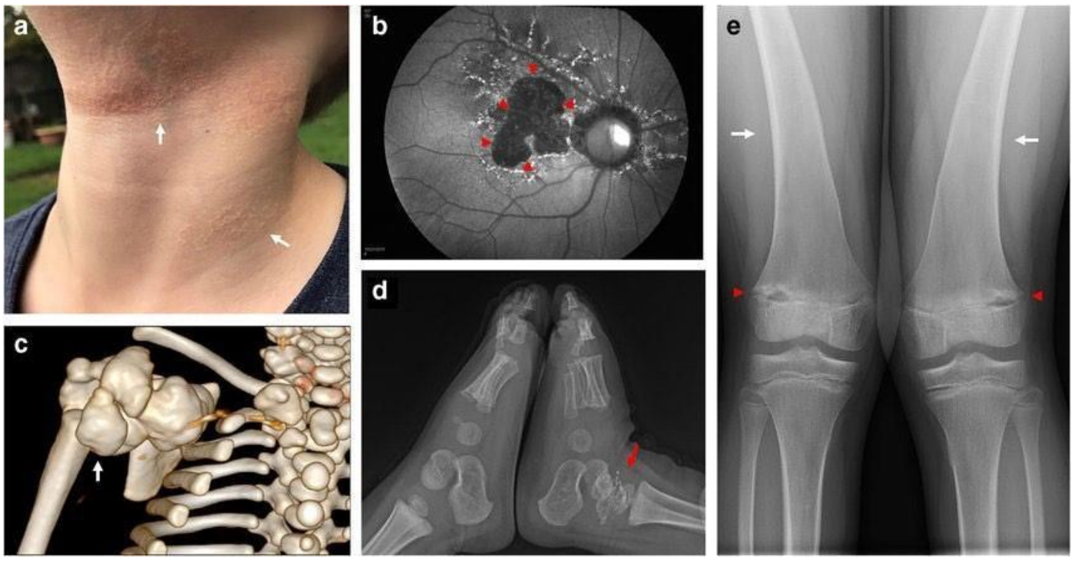
Arterial Calcification of Infancy is inherited in an autosomal recessive (5*) pattern in which both copies of the gene in each cell have a mutation. The parents of an individual with autosomal recessive disease each carry one copy of the mutated gene but usually do not show signs and symptoms of the disease. Figure 4 shows the gene transmission of parents with autosomal recessive disease.



Symptoms and Signs

This disease involves many systems, particularly the cardiovascular system, with possible involvement of the central nervous system. There is also vascular smooth muscle cell proliferation, which further reduces the lumen diameter and compromises blood flow. The hepatic artery is the most commonly calcified artery (81%), followed by the aorta (80%), pulmonary artery (67%) and coronary artery (53%), while the renal artery is affected in 39% of cases. In the literature, arterial stenosis has been reported in at least 72.4% of GACI cases. Diffuse Arterial Calcification of Infancy was first described by Bryant and White in 1901 after autopsy of a 6-month-old child. For GACI, a rare fatal disease that occurs in early infancy, there were 50 cases reported before 1971 and 150 cases reported worldwide since then. Survival rates vary widely, but mortality is high, with 24.4% of patients dying in utero or being stillborn and 60% dying within the first six months of life. The causes of death in infants are congestive heart failure, myocardial infarction, persistent arterial hypertension and multiple organ failure. In some rare cases, there may be spontaneous regression with age, while those who survive to adulthood may have musculoskeletal complications, enthesis mineralisation and cervical spine fusion. Symptoms of GACI include respiratory distress, arterial calcification, gastrointestinal problems, joint calcification, hearing loss, high blood pressure, decreased or absent pulses, cardiomyopathy, cardiomegaly or limb oedema. They may struggle with heart failure or hypertension. They also develop joint and parenchymal organ calcification, including renal, gastrointestinal and pulmonary complications. Neonates with GACI may also have feeding difficulties or growth retardation. On ultrasound or echocardiography, the condition is characterised by thickening of the arterial surfaces with calcification of the arteries or heart valves. Additional findings may include skin and retinal manifestations typical of pseudoxanthoma elasticum (PXE), periarticular calcifications, development of rickets after infancy, cervical spine fusion and hearing loss. Figure 5: a: Skin findings consistent with PXE. Characteristic yellowish papules occurring in a patchy, reticular pattern (white arrows), b: Fundus autofluorescence imaging in an adult patient with ENPP1 deficiency reveals a large area of hypoautofluorescence (red arrowheads) with spots of hyperautofluorescence surrounding the area of atrophy due to atrophy of the retinal pigment epithelium, c: Large area of periarticular calcification involving the shoulder joint, d: Periarticular calcifications involving the ankle joint,

e: Irregularities in the distal femoral metaphyses (red arrowheads) consistent with hypophosphataemic rickets. Bilateral bending of the femoral shafts (white arrows) causing genu valgum deformity of the knees is shown.



Source:https://www.researchgate.net/figure/Clinical-images-of-extravascular- features-in-patients-with-GACI-a-Skinfindings_fig2_339935468

Calcification of blood vessels may cause arterial stiffening/hardening, resulting in weak pulses or complete loss of pulses. In a study investigating the effect of GACI on hearing impairment, 7 of 15 patients who underwent audiological evaluation had bilateral hearing loss and 1 patient had unilateral hearing loss. Ear calcification was observed in 6 of the patients who underwent cranial CT. This may lead to recurrent otitis media in the future. Early audiological and otological evaluation is important in infants with GACI. In the literature, some clinical signs of pseudoxanthoma elasticum (PXE) (such as angioid lines in the retina and papular skin lesions) have been reported to be related to GACI (GACI, type 2). In the autopsy of an infant diagnosed in the fetal period who died after 29 days of treatment, histological examination of tissue samples showed arterial dystrophic calcifications along the entire length of the aorta, pulmonary arteries, carotids, renal arteries, coronary, periadrenal arteries, bronchial arteries and intramuscular arterioles of skeletal muscles and peritoneal vessels. It is evident from this case that the calcifications affected the skeletal muscles as well as the large arteries. In a study of patients with GACI who survived to adulthood, it was reported that calcification (enthesis) was present at the contact points of tendons or ligaments with bones in 3 patients and local musculoskeletal pain was associated with this calcification. In a study of 3 foetuses, hyperechogenic valves or annuli were the first detectable finding in the second trimester in all 3 foetuses, followed by relatively rapid progression of arterial wall calcification. Three novel mutations in the GACI-related ENPP1 gene were found in two of the cases. It has been suggested that GACI should be suspected when hyperechogenic heart valves, annuli or arterial walls are noted after excluding other causes of arterial calcification. Genetic testing is important for prenatal and future preimplantation genetic diagnosis. In conclusion, GACI has early onset symptoms and a very poor prognosis and early diagnosis of GACI is very important. Clinicians should suspect GACI when children develop hypertension or vascular calcification soon after birth (mean duration 3 months).

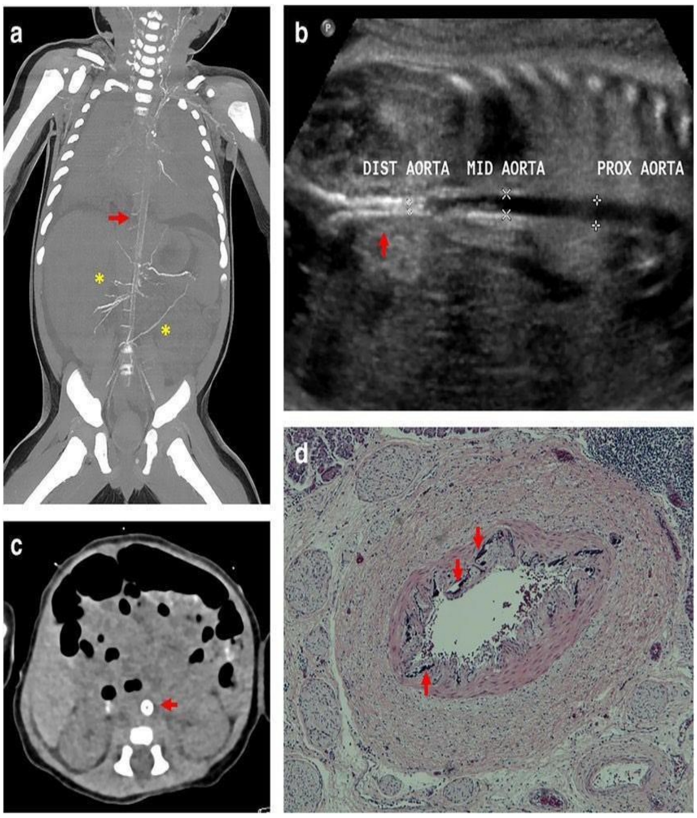


Figure 6 : A: Coronal views of computed tomography scan showing diffuse calcification involving the descending aorta (red arrow) and multiple branching arteries (yellow asterisks).

B: Prenatal ultrasound shows calcification and severe narrowing of the distal aorta (red arrow)

C: Axial views of the computed tomography scan show a calcified and severely narrowed descending aorta (red arrow) D: Medium-sized pancreatic artery showing calcification (red arrows) along the inner elastic lamina (haematoxylin and eosin stain) Source:https://www.researchgate.net/figure/Clinical-images-of-vascular-calcifications-in-patients-with-GACI-a-Coronalviews-of-a_fig1_339935468

Diagnosis

The diagnosis of GACI is guided by cardiovascular symptoms associated with diffuse arterial calcification on imaging in infancy (after exclusion of secondary causes) and cardiovascular symptoms associated with bialelic pathogenic variants *in ENPP1* or *ABCC6* identified on molecular genetic testing. Computed tomography (CT) is the preferred imaging modality for the evaluation of calcifications. Echocardiogram detects stenosis of the arteries close to the heart, including the coronary and pulmonary arteries, ascending aorta and aortic arch, and large arteries arising from the aortic arch. Left ventricular hypertrophy and/or the presence of pericardial effusion are checked. US, CT and MR are the most commonly used methods in the initial imaging evaluation and follow-up in the diagnosis of the disease. The aim of early diagnosis and treatment in children with GACI is to ensure regression of arterial calcifications and arrest the development of arterial stenosis.

Cases and Treatment

In one study, a fetus with increased vascular echogenicity on fetal echocardiography at 30 weeks of gestation was born prematurely at 34 weeks and neonatal respiratory and cardiac distress developed. Postnatal echocardiogram showed right ventricular dysfunction and calcification. Generalised arterial calcification of infancy (GACI) was diagnosed by CT scan at 10 days of age. Sodium thiosulphate (calcium chelator) treatment was initiated and the infant was treated for 6 months and it was reported that calcification decreased on follow-up CT. In another study, bisphosphonates named etidronate was given to 12, pamidronate to 8 and rosedronate to 1 of 15 patients. The mean age at initiation of bisphosphonate use was 32 days, and 10 patients started treatment before 2 months of age (in 4 of these cases in the first week of life). The mean duration of treatment was 480 days (60-835 days). Only 1 of the children who died was reported to have received bisphosphonates from birth to the time of death at 1 month of age. Eight patients received oral phosphate supplements and/or an active form of vitamin D for the treatment of hypophosphataemia. The mean age at initiation of rickets treatment was 5.5 years (range: 1.5 months-14.6 years). Thirteen patients received medication for heart failure and 12 patients received antihypertensive treatment. It was reported that no significant worsening of vascular calcification was observed by CT after at least 7 months of treatment. In another case report study, zoledronic acid injection was administered to a 5-year-old child admitted to hospital with a diagnosis of GACI. Systemic vascular calcification did not improve significantly, but abnormal calcium and phosphorus metabolism improved after four doses (each dose was 0.0125 mg/kg, 2 months apart). Although zoledronic acid was not successful in reversing systemic vascular calcification, it has been reported to have a modulatory effect on calcium and phosphorus metabolism abnormalities. As systemic calcifications occur due to long-term mineral deposition, further follow-up is needed to monitor the efficacy of these therapies. GACI offers several treatment options, including the possibility of heart transplantation. There have been successful cases of children under 18 months of age suffering from end-stage heart failure due to severe myocardial infarction and extensive coronary artery calcification undergoing heart transplantation, with no recurrence of calcification for up to two years. It has been reported that standard antihypertensive therapy with aspirin can be used to manage GACI in individuals with severe coronary stenosis. In addition, intravitreal VEGF inhibitors may help choroidal neovascularisation, while calcitriol oral phosphate supplements have been used for hypophosphatemic rickets. It is important to note that none of the treatments trialled were able to completely clear or reverse pre-existing calcifications in PXE and GACI patients. Due to the complexity of these conditions, no single treatment modality may be adequate and more than one form of treatment may be required. In one case, the patient benefited from blood pressure control achieved with a combination of metoprolol and amlodipine besylate. In a non-randomised, comparative, retrospective study of a small number of patients (n=43), the survival rate of infants treated with bisphosphonates was significantly improved. However, both spontaneous resolution of calcifications and fatal outcomes despite early treatment have been reported. It has therefore been reported that further studies are needed to determine whether bisphosphonate treatment is indeed protective or whether the resolution of calcifications reflects the natural history of the disease. A preterm male infant with heart failure, severe hypertension and extensive calcifications in all arterial territories was treated with etidronate (18 mg/kg/day); however, the clinical condition did not improve and no improvement in calcifications was observed. It was reported that the prognosis could have been very poor even if the diagnosis of GACI was made early and bisphosphonate treatment was started early for the baby who died due to ischaemic heart failure in the 6th month of his life. In another study in which calcifications were surgically removed, it was reported that a calcified mass extending to the aortic arch, left subclavian artery (LSA) and left common carotid artery (LCCA) was detected intraoperatively after aortotomy, partially removed and end-to-end anastomosis was performed. Postoperatively, after partial removal of the obstructive calcified plaque from the aortic arch, the increased echogenicity of the aortic arch and the remaining calcifications can be better assessed by echocardiography. The combination of clinical features and diffuse calcification of the aortic arch and its branches revealed on imaging and intraoperatively, together with histopathological findings and genetic testing, confirmed the diagnosis of GACI-2 with severe early-onset manifestations. In this case, both surgical treatment of the cardiovascular complication and medical treatment with bisphosphonates were reported to have favourable results; the patient successfully survived infancy without heart failure and with effective control of systemic hypertension. Zoledronic acid, a potent nitrogen (N) containing bisphosphonate, was administered 0.025 mg/kg intravenously every 3 months in accordance with the recommendations for the use of bisphosphonates in paediatrics. The patient was reported to be 18 months old at the time of the study and was still receiving intravenous zoledronic acid treatment; CT scan and ultrasound showed a significant regression of aortic arch calcifications without stenosis (0.5 mm from 9 mm at CT level). No side effects of long-term administration of bisphosphonates have been identified. Another retrospective study of 55 patients with GACI found that hypophosphataemia and hyperphosphaturia were associated with increased survival. However, the same study revealed that deaths were largely limited to the so-called "critical period" covering the first 6 months of life, with only one death occurring later, at 7 months of age. Moreover, hypophosphataemia and hyperphosphaturia did not develop until later in life, so these phosphate abnormalities themselves were reported to be unlikely to affect survival. Another study on bisphosphate therapy is a retrospective case study by Rutsch et al. Although bisphosphonate treatment reduced the mortality rate in infancy to 35%, 7 of 17 patients treated with bisphosphonates died in infancy (Rutsch et al., 2008). It has been reported that the exact cause of death in these infants is not clear, but since resolution of calcification does not always prevent the emergence of hypertension, untreated arterial vascular stenosis due to myointimal proliferation instead of calcification may be a factor causing these deaths. There are also several reports of a possible association between long-term bisphosphonate use and atypical skeletal fractures, but prospective studies are needed to determine whether a causal relationship exists.

This disease is also known as Arteriopathia calcificans infantum, Diffuse arterial calcifying elastopathy of infancy, Idiopathic infantile arterial calcification, Idiopathic obliterative arteriopathy, IIAC, Infantile calcifying arteriopathy, Medial coronary sclerosis of infancy and Occlusive infantile arteriopathy.

Case Report

Our patient is the first and only child of a 36-year-old mother and a 39-year-old father who are not related to each other. He was born in the hospital at term with a birth weight of 2700 grams, and his family history was unremarkable. He was hospitalised in the neonatal intensive care unit for 1 month due to respiratory distress after birth. During his hospitalisation, the family was told that there was occlusion and calcification in the vessels in the brain. The patient underwent genetic research due to dysmorphic face and was diagnosed with GACI Syndrome. Hearing loss was reported in the scans. At the age of 5 months and 12 days, our patient who was brought to the emergency department with complaints of weakness, drowsiness and failure to feed was admitted to the paediatric intensive care unit for the second time because of a haemoglobin level of 4.9. Before referral to our unit, our patient, who was hypotensive with decreased peak heart rate, was intubated in the emergency department and adrenaline infusion was started. ES (Erythrocyte suspension) transfusion was given to our patient whose control haemoglobin was 2.8. Our patient, who was admitted to our ward, weighed 4030 grams and was 55 cm tall. No known allergy was identified in our patient. When he came to the ward, Sf was loaded at 20cc/kg because his Glasgow coma scale was 8, pulse fullness was weak and tachycardia was present. Necessary tests were performed and factor 2-5-7-9-10 deficiency was detected and TDP (fresh frozen plasma) transfusion was performed. OG was inserted because the nose was dysmorphic. A urinary catheter was inserted. Our patient, who was followed up with closed orals, was started on ½ mm 17 cc/h. Keppra 120 mg/half hour was loaded in the first 8 hours of hospitalisation in the intensive care unit because of 2 seizures lasting 10 seconds. Andrenalin infusion continued because of hypotensive values. Vitals are unstable. Hydrocortisone and precedex infusion was started. Our patient who received ES and TDP infusion on the 2nd day of intensive care hospitalisation received TS and Albumin infusion on the 3rd day of intensive care hospitalisation. CT scan was performed and subdural haematoma was diagnosed.

In this case report, it was observed that a child with factor deficiency was diagnosed with SAH with narrowing of the vessel and calcification, and all treatments were applied for the cause and symptoms, but SAH-induced brain involvement was observed. The patient was diagnosed as brain dead and died on the 5th day of hospitalisation.

General View

Our patient was received from 112 with a Glasgow Coma Scale of 3 and intubated at 11 cm with a 5.0 cuff intubation tube. He is followed up with mechanical ventilator. A 6 Fr urinary catheter was present. Skin colour was white-pale and low haemoglobin was observed in the blood results. The patient had a syndromic facial appearance and the root of the nose was flattened. The patient was found to be anisocoric at the time of presentation to the clinic. When family and past data were questioned, it was learnt that anisocoria was present previously. The patient also had hearing loss. Since the bleeding did not stop after invasive procedures, factor deficiency was suspected and necessary tests were performed.

Developmental Assessment

Physical Development

A baby born 2700 grams is expected to gain 150-210 g/week in the first 6 months. Our patient, who is 5 months and 14 days old, is expected to weigh between 6000 and 7320 grams, but is below the 3% Persantil curve with 4030 grams. Our patient, whose height is 54 cm, is also below the 3% Persantil curve.

Psychomotor Development

A 5-month-old infant is expected to distinguish strangers, show interest in new objects, distinguish himself/herself from his/her surroundings, smile at his/her mirror image, distinguish strangers from family members, explore his/her own body, show dissatisfaction when objects are moved away, try to respond to speech, make a-gu sound and listen to speech. When our patient came to the clinic, psychomotor skills could not be observed because he was intubated. However, although he did not receive any sedation, his reflexes could not be obtained. No response to painful stimuli was observed. In the family history, it was found that the baby had hearing loss due to an inherited disease, had frequent seizures and psychomotor skills were not age appropriate.

VITAL FINDINGS:

Date/Time	Fire	Pulse	Respiration	Blood Pressure	Saturation	Blood Sugar
22.11.2023 00.00	36.0	150	55	93/44	100	422
22.11.2023 08:00	36.0	118	35	96/42	100	488
22.11.2023 16:00	36.0	160	35	98/61	100	400
23.11.2023 00:00	36.1	124	35	97/57	98	489
23.11.2023 08:00	36.1	120	35	61/30	99	431
23.11.2023 16:00	36.0	122	32	105/58	100	466
24.11.2023 00:00	36.1	116	25	122/70	100	408
24.11.2023 08:00	36.2	102	25	117/57	100	422
24.11.2023 16:00	36.1	111	25	76/41	100	457

*Vital signs of the patient were followed up 24x1 in the clinic and mean values during the day are given in the table.

Blood Gas Taken at Admission and 1 Hour After Admission

	CONCLUSION	UNIT	CONTROL KG
PH	7.04		7.25
pCo2	2.36	mmHg	2.21
HCO3	10.2	mmol/l	9.4
LACTAT	13.45	mmol/l	11.8

Laboratory Findings:

Audit Name	Day Conclusion	Day Conclusion	Day Conclusion	Day Conclusion	Day Result	Reference Ranges	Unit
WBC	17.6	16.48	14.47	19.8	9.94	6-135	X103/mm3
RBC	4.08	3.41	3.92	3.34	2.33	3-4.8	x106/p1
HGB	11.6	9.6	11.4	9.5	6.9	9.4-14.1	g/dL
HCT	34.3	28.3	33.9	28.9	20.2	31-44	%
PLT	75	45	82	72	49	150-450	XI 03/mm3
NA+	156	163.5	171.8	153.1	149.6	135-145	Mmol/L
K+	3.86	4.18	3.04	3.38	3.30	3.5-4.5	Mmol/L
CI-	118	133	137	127	121	98-106	Mmol/L
Lac	5.53	2.74	2.00	1.82	2.68	0.5-1.6	Mmol/L

Medication Therapy

Vanco 4x60 mg iv inf, Desefin 2x200 mg iv inf, Keppra 2x40 mg iv inf, 3% NaCl 4x12cc iv inf were administered. ES, TDP, TS, ALBUMIN were given to the patient according to the blood results and at the same time, Sf was loaded according to the patient's need, Kvit iv push 4 mg, transamine 60 mg iv push, Parol 40 mg iv inf, NaHCo3 was loaded and Adrenalin, Hydrocortisone, Precedex were administered as 24 hour infusion.

Nursing Care Process of the Patient Using the Nursing Process in the Care of Infant/Child and Family

The nursing process is a problem-solving method used to identify the health care needs of a healthy or sick individual and to provide individual-specific care. The nursing process forms the basis of nursing practice. It is an organised and systematic approach in the implementation of nursing, which is defined as the diagnosis and treatment of human responses to current and potential health problems and life situations. Nursing process is planned, individual-centred, dynamic and continuous.

Purposes of Use of Nursing Process in the Field of Child Health

-Helps to provide nursing care at the highest level and based on needs.

-It guides nurses in identifying the problems of children and/or family members, setting realistic goals and addressing the problems appropriately.

-Supports the identification and utilisation of the strengths of children and/or family members.

-Improves communication with the child and/or family and team members.

-Provides continuity in care.

Steps of the Nursing Process

The nursing process consists of five steps that are different from each other but complement each other; data collection, determining the nursing diagnosis, planning, implementation, and evaluation.

Data collection

It involves obtaining subjective and objective data. Subjective data are data expressed by the child and family members, which cannot be observed and measured. Objective data is data that can be measured and observed by health professionals. Data are obtained by history taking, physical assessment, observation and analysis of records. Data analysis helps to form nursing diagnosis and to shape short and long term goals.

Determining nursing diagnosis

Nursing diagnoses are clinical decisions about the individual, family or community's responses to current or potential health problems/life processes. Nursing diagnoses form the basis for the selection of nursing interventions to achieve results for which the nurse is responsible and authorised. Nursing diagnosis is different from medical diagnosis. While medical diagnosis refers to the disease, nursing diagnosis shows the difficulties experienced by children and parents due to the disease process. It focuses on the physical, psychosocial and cognitive reactions of children and parents to the disease or the effects of treatment. Nursing diagnoses are used in all areas of health care (e.g. health protection, promotion, improvement).

A nursing diagnosis defines current (existing) or potential (due to risk factors) health problems. A current nursing diagnosis is a clinical judgement that the nurse confirms the validity of due to the presence of major defining features. Possible nursing diagnoses are suspected diagnoses due to the presence of certain factors. The word "risk" should be included in the nursing diagnosis statement to distinguish between real and possible health problems. For example; "Risk of impaired skin integrity".

An existing nursing diagnosis consists of 3 parts: problem (name of the nursing diagnosis/diagnostic nomenclature), etiological factors (related factors) and descriptive features (symptoms and findings associated with the diagnosis). Associating the patient's problem with causative or contributing factors enables individualised care to be provided. Table 2.1 shows some of the nursing diagnoses in the classification system of nursing diagnoses published by the North American Nursing Diagnoses Association (NANDA).

Planning

Planning includes setting goals and priorities, identifying resources, deciding on nursing interventions and writing the care plan. The participation of the child and/or parents in the planning of care is an important aspect of effective care.

Application

It is the step in which the initiatives planned to achieve the goals are implemented. This phase includes decision making, observation and communication. The safe and effective delivery of nursing care depends on the nurse's professional knowledge, experience and ability to establish positive interpersonal relationships. The practice ends when the nurse's interventions are completed and the child's reactions and results are permanently recorded. At this stage, it is important that the child and family participate in the care as much as they can.

Evaluation

In this step of the nursing process, it is determined whether the goals set are achieved and whether the nursing interventions are effective. If the desired goals are not achieved as a result of the implementation of the planned nursing interventions, the additional data needed are defined and the process is restarted. If all of the planned goals have been achieved, care is terminated. Assessment results are recorded.

Nursing Care Process of the Case

Nursing Diagnoses	Expected Results	Initiatives	Evaluation
Prolonged APTT time, factor deficiency and failure to stop bleeding after intravenous intervention "**Risk of haemorrhage**"	Early recognition of signs and symptoms of bleeding and prevention of bleeding.	-Maintenance and evaluation of values such as platelet count, Htc, Hb, PT, aPTT upon physician's request -Minimising invasive interventions, applying pressure to the area after the intervention -Monitoring signs and symptoms of bleeding such as petechiae, haematoma, ecchymosis, haematuria, haematemesis, melena -Monitoring the patient in terms of mental status changes -Examination of secretions, faeces, urine, vomit, sputum, etc. for bleeding -Following up on what he took out -Monitoring the patient for signs and symptoms of shock -Decrease in blood volume will cause a decrease in the level of oxygen in the circulation, so that oxygen is given as desired.	Invasive procedures are minimised. No signs and symptoms of haemorrhage were observed
"**Risk of fluid volume deficiency**"	No signs and symptoms of	-Act follow-up,	No signs and symptoms of fluid

due to fluid loss secondary to malnutrition	fluid volume deficiency will be observed in the patient (decrease in skin turgour and adequate urine output)	-Monitoring the patient for signs of haemorrhage and hypovolaemia -Monitoring serum electrolytes, BUN, urine and serum osmolarity levels, -Consideration of additional fluid losses related to vomiting, diarrhoea, fever and drains. -Administration of blood and blood products or electrolyte fluids in accordance with the doctor's order8	volume deficiency were observed (skin turgour normal, daily urine volume and frequency normal)
"**Risk of increased intracranial pressure**" due to cerebral haemorrhage	Maintaining normal levels of intracranial pressure	-Monitoring the patient for respiratory irregularity and associated hypoxia (PaO2), -Close monitoring of blood pressure, -Monitoring patient compliance with the ventilator (>+5 cmH2O PEEP in mechanical ventilation increases intrathoracic pressure and decreases venous return to the brain and heart) -Pay attention to skin changes such as cyanosis in the patient -Observation of the patient for signs of restlessness -Positioning the patient appropriately, -If the patient needs to be aspirated, do not force the patient, and take care not to increase intracranial pressure in case of retching and coughing, -Monitoring and recording of bowel movements and excretion, -Taking precautions to prevent the development of constipation in the patient, giving intestinal motility regulators, stool softening drugs or laxatives to prevent straining -Evaluation of the patient in terms of seizure symptoms and signs, as it may cause an increase in IOP by increasing cerebral metabolism and blood flow	Sudden changes in the patient are being assessed. There has been no change in his condition.

		-Ensuring and monitoring the sedation of the patient	
Disruption of the blood clotting process and Depending on a haemoglobin level of 2.8'' **Risk of Impaired Cerebral Tissue Perfusion''**	To provide early recognition and treatment of changes that may occur in cerebral tissue	Measuring the head circumference every day -Evaluation of parameters such as blood pressure, body temperature, pulse and respiratory rate to determine whether intracranial pressure is elevated -Monitoring and recording anterior fontanelle tension	Haemoglobin values are closely monitored. The patient is analysed by brain MRI and CT scan. There was no change in his condition. blood pressure, body temperature, pulse and
		-Monitoring the tension of the veins in the head and informing the doctor in possible cases -Evaluation of pupil reaction -Monitoring of projectile vomiting	respiratory rate within normal values
Due to the patient's inability to maintain body temperature'' **Ineffective Thermoregulation Hypothermia''**	Keeping the patient's body temperature at normal levels	-Attempting to warm the patient with appropriate heating beds -If the child has to be uncovered for the applications to be performed, finish the process quickly and try to maintain the child's body temperature -Hand heating of medical instruments such as stethoscope etc. that will come into contact with the child and bringing them into contact with the child -Controlling the room temperature. -Dressing in accordance with the room temperature. -Vital monitoring. -Ensuring that the patient is dried quickly if there is fluid loss (urine, etc.) that will come into contact with the patient's skin.	The patient was warmed with a warming bed. Body temperature remained at 36.136.2. Necessary follow-up is being done to maintain the body temperature at normal levels.

"**Risk of Changes in Blood Glucose**" due to blood glucose levels above 400mg/dl**:** **Hyperglycaemia**	To be able to closely monitor the patient's blood sugar and make the necessary interventions	-Checking the patient's fingertip blood glucose at appropriate intervals. -Fluid electrolyte monitoring. -Monitoring the patient for signs and symptoms of ketoacidosis -Act follow-up. -Evaluation of skin moistness, turgour, urine quantity, density, fluid intake. -Close monitoring of serum potassium, sodium and phosphate levels Hourly monitoring of neurological status. -Close monitoring of cardiac function and circulatory status. -If ketoacidosis occurs, initiation of appropriate protocols to correct dehydration, restore the insulinglucagon ratio, treat circulatory collapse, ketoacidosis and electrolyte imbalances.	Regular blood glucose monitoring was performed and the patient whose blood glucose level did not fall below 400 mg/dl was started on necessary iv treatments.
Due to the lack of spontaneous breathing of the patient " **Ineffective Breathing Pattern / Dysfunctional Response to**	To ensure that the respiratory rate and gas exchange in the lungs are within normal limits.	-Vital signs of the patient are taken. Changes related to respiratory parameters are notified to Dr. -Monitoring the speed and depth of the patient's breathing. -Checking the mechanical ventilator settings.	The patient continues to be followed up on mechanical ventilator. No change in his
Mechanical Ventilator Weaning"		-Assessment of oxygen saturation. -Listening to lung sounds. If there is a change in respiratory sounds, inform the physician -Evaluation of the patient's respiratory parameters by taking blood gas. Performing interventions deemed appropriate by the doctor. -Postural drainage. -Monitoring the patient for cyanosis and respiratory muscles	condition was observed.

'''Awareness of the ECT is due to imbalance and weight, urinating less than 1 cc per hour''' **Risk of impaired urinary excretion''**	Ensuring that the child has a dry diaper and urinates in accordance with its weight	Follow-up of -ACT. Evaluation in terms of urine colour density. -Foley catheter insertion if deemed necessary. -Monitoring blood results. Checking urea uric acid BUN values. -Trying to ensure fluid electrolyte balance.	The patient was followed up with ACT. He was supported with appropriate IV therapies.
Due to hypotension'' **Decrease in cardiac out-put related to decrease in circulating blood volume''**	Early detection of signs and symptoms indicating decreased cardiac output	-Monitoring of vital signs. In particular; tachycardia, increased respiratory rate, hypotension, bradycardia, cardiac arrhythmias, distension in the neck veins, rhythm disorders, decreased urine volume, cold, moist cyanotic pale skin and reporting changes to the physician. -Observation for signs and symptoms of hypoxaemia (confusion, restlessness, dyspnoea, arrhythmia, tachycardia, cyanosis) -Monitoring and recording the amount of fluid taken in and out, -CVP follow-up and notification of changes to the physician. -Daily weight monitoring -Evaluation of dehydration findings (dryness of the skin and mucous membranes, decreased urine volume, -Fluid monitoring and medication, regular monitoring of laboratory findings (BUN, Creatinine, Na+, K+), reporting changes to the physician. -Ordered administration and monitoring of inotropic and vasoactive agents to increase the strength of ventricular contraction.	Blood pressure was monitored closely. The patient was supported with appropriate inotropes and iv therapies. There was no change in general condition.
"impaired/reduced cell perfusion" due to a haemoglobin value of 2.8 or a reduction or	Increasing the haemoglobin level to normal levels and ensuring tissue perfusion	-Monitoring vital signs. -Transfusion of appropriate blood products on doctor's order. -Maintaining optimal cell perfusion, oxygenation, gas exchange, monitoring indicators of the	The patient was monitored closely. The patient's haemodynamics was tried to be maintained by

dysfunction of Red Blood Cells**.**		patient's response to treatments (normal vital signs, haemodynamics, adequacy in organ functions) -Maintaining CHD and Hb concentrations at adequate levels in complete blood count The patient has adequate hydration, infection, pain, transfusion reactions do not develop in the patient	giving blood products for blood values. HB value increased up to 11.4.
Inability to feed by mouth due to intubation, Orogastric tube placement and **"Risk of deterioration of the oral mucous membrane** due to bleeding coagulation disorders caused by factor deficiency**.**	Protect and maintain the integrity of the oral mucous membrane	-Assessment of the oral mucous membrane for deterioration at appropriate intervals. -Mouth care -Evaluation of the circumference of the intubation tube in terms of wound and ensuring that the tube does not compress the edge of the mouth. -Ensuring proper hydration -Moisturising the lips -Be gentle during intraoral aspiration to prevent bleeding.	The integrity of the patient's oral mucous membrane was maintained.
Due to the presence of intubation and invasive catheter " **"Risk of Infection**	To prevent the patient's risk of infection due to invasive intervention	-Observation of clinical signs of infection (fever, pain, turbidity in urine, purulent discharge, etc.) -Paying attention to hand hygiene -Taking standard precautions to prevent the development of infection in the patient. Implementation of isolation when necessary -Avoiding unnecessary invasive procedures for diagnostic or therapeutic purposes. -Paying attention to aseptic technique in invasive interventions. -Monitoring catheter access sites and incision sites for signs of infection -Checking the patient's vital signs.	The patient was monitored by taking necessary precautions, the risk of infection persists.

Inadequate tissue perfusion , Pay, Surgical Intervention and Due to Movement Restriction**'' Risk of impaired skin integrity related to cell hypoxia and inadequate perfusion''**	To ensure skin integrity	-Positioning the patient every 2 hours. -At each position change; observation in terms of erythema and whiteness, checking tissue elasticity and temperature by palpation. -Increasing protein and carbohydrate intake if appropriate to maintain positive nitrogen balance, daily weight monitoring, checking serum albumin level at appropriate intervals to monitor the condition	The patient's skin integrity was preserved. The skin is pink, not moist, and there is no disruption of tissue integrity. Necessary precautions were taken. Tissue perfusion was ensured by laying an air mattress.
		-Increasing the frequency of rotation if there is any redness and this does not disappear within 1 hour after rotation. -Ensuring adequate tissue perfusion. -Laying an air mattress to protect the patient's pressure zones. -Ensuring adequate hydration of the patient Ensuring that bed linen is clean, dry and wrinkle-free -Evaluation of the patient's skin (Braden pressure scale is used, pressure zones are checked) -Ensuring that the skin is clean and dry -Following up on what he took out -The patient's intubation tube is repositioned 1-2 times a day to eliminate pressure on the lip margin. -Keeping the skin dry by preventing contact of urine with the skin.	
"Disruption in the continuity of family processes" due to hospitalisation and chronic illness	Maintain a functional system in which family members mutually support each other	-Helping the family to assess the situation -Encouraging the family to take a realistic view by providing accurate and complete information and answering questions Creating a supportive and private, privacy-protective hospital environment within the family -Involving family	Necessary support was given to the family. Parents were encouraged to have skin-to-skin contact and were allowed to talk to and touch their baby.

		members in the care of the sick member whenever possible -Encouraging family members to verbally express feelings of guilt, anger and blame and to recognise these feelings -Providing the family with the preliminary guidance they may need while the error continues -Preparing family members for the symptoms of depression, anxiety and addiction that are a natural part of the illness experience -Ensuring that other professional members are assisted in problems outside the field of nursing	
"Difficulty in the Caregiver Role" due to difficulty in performing necessary caregiving activities	Determine a plan to reduce the strain on the caregiver	-Assessment of factors that cause or increase difficulties in the caregiving role -Assessment of the caregiver's and others' interpretation of the disease state and periodic reassessments	-The family was encouraged by involving them in the care as much as possible. Every day the mother visited her
		-Showing empathy and trying to provide a sense of competence -Identification of social resources that can be provided	baby for 5 minutes and changed her baby's diaper and wiped her body,
"Deterioration in parent-infant attachment" due to intensive care hospitalisation	Increasing the parent's attachment behaviours such as smiling and talking to the baby	-Encouragement to share parenting difficulties and usual or recent stressors -Allowing parents to watch while caring for the child. -Role modelling in terms of relaxation procedures, providing sensory stimuli (verbally, by touching) -Encouraging parents to participate in childcare -Analysing the expectations of parents from their children and revealing real and unrealistic expectations	The mother visited her baby for 5 minutes every day

SOURCE

Boyce, A. M., Gafni, R. I., & Ferreira, C. R. (2020). Generalised Arterial Calcification Of Infancy: New Insights, Controversies, And Approach To Management. Current Osteoporosis Reports, 18(3), 232-241. Https://Doi.Org/10.1007/S11914-020-00577-4

Brunod, I., Tosello, B., Hassid, S., Gire, C., Thomachot, L., & Panuel, M. (2018). Generalised Arterial Calcification Of Infancy With A Novel ENPP1 Mutation: A Case Report. BMC Pediatrics, 18(1), 217. Https://Doi.Org/10.1186/S12887-018-1198-4

Bulfamante, G. P., Carpenito, L., Bragantini, E., Graziani, S., Bellizzi, M., Bagowski, C. P., Shoukier, M., Rivieri, F., Soffiati, M., & Barbareschi, M. (2021). Generalised Arterial Calcification Of Infancy Type 1 (GACI1): Identification Of A Novel Pathogenic Variant (C.1715T>C (P.Leu572Ser)). Diagnostics (Basel, Switzerland), 11(6), 1034. Https://Doi.Org/10.3390/Diagnostics11061034

Carpenito, L. J. (2012). Handbook of Nursing Diagnoses (Translated by F, Erdemir.) Ankara: Nobel Tıp. (Original Publication Year 2010)

Donuru, A., Kandula, V., Oliver, E., & Saul, D. (2020). Generalised Arterial Calcification Of Infancy. Radiology. Cardiothoracic Imaging, 2(4), E190226. Https://Doi.Org/10.1148/Ryct.2020190226

Fãgãrãşan, A., Gozar, L., Ghiragosian, S. R., Murariu, M., Pop, M., Crauciuc, A., Miclea, D., & Şuteu, C. C. (2022). Severe Early-Onset Manifestations Of Generalised Arterial

Calcification Of Infancy (Mimicking Severe Coarctation Of The Aorta) With ABCC6 Gene Variant - Case Report And Literature Review. Frontiers In Cardiovascular Medicine, 9, 1032519. Https://Doi.Org/10.3389/Fcvm.2022.1032519

Ferreira, C. R., Ziegler, S. G., Gupta, A., Groden, C., Hsu, K. S., & Gahl, W. A. (2016). Treatment Of Hypophosphatemic Rickets In Generalised Arterial Calcification Of Infancy (GACI) Without Worsening Of Vascular Calcification. American Journal Of Medical Genetics. Part A, 170A(5), 1308-1311. Https://Doi.Org/10.1002/Ajmg.A.37574

Galletti, S., Nitschke, Y., Malavolti, A. M., Aquilano, G., Faldella, G., Corvaglia, L., & Rutsch, F. (2011). Generalised Arterial Calcification Of Infancy: Fatal Clinical Course Associated With A Novel Mutation In ENPP1. JIMD Reports, 1, 23-27. Https://Doi.Org/10.1007/8904_2011_11

Gurzu, S., Burlacu, D., Sánta, R., Jung, I., Slevin, M., & Fulop, E. (2022). Case Report: Coexistence Of Generalized Arterial Calcification Of Infancy (GACI) AndMaternal Infections With Cytomegalovirus And Toxoplasma Gondii-Unexpected Fatal Complication In A Newborn. Frontiers In Pediatrics, 10, 922379. Https://Doi.Org/10.3389/Fped.2022.922379

Hailu, S. S., Derbew, H. M., & Hailemeriam, T. (2023). Generalised Arterial Calcification Of Infancy In A Neonate With Acute Kidney Injury: A Rare Case Report. Radiology Case Reports, 18(10), 3376-3379. Https://Doi.Org/10.1016/J.Radcr.2023.07.019

Kawai, K., Sato, Y., Kawakami, R., Sakamoto, A., Cornelissen, A., Mori, M., Ghosh, S., Kutys, R., Virmani, R., & Finn, A. V. (2022). Generalised Arterial Calcification Of Infancy

(GACI): Optimising Care With A Multidisciplinary Approach. Journal Of Multidisciplinary Healthcare, 15, 1261-1276. Https://Doi.Org/10.2147/JMDH.S251861

Khan, T., Sinkevicius, K. W., Vong, S., Avakian, A., Leavitt, M. C., Malanson, H., Marozsan, A., & Askew, K. L. (2018). ENPP1 Enzyme Replacement Therapy Improves Blood Pressure And Cardiovascular Function In A Mouse Model Of Generalised Arterial Calcification Of Infancy. Disease Models & Mechanisms, 11(10), Dmm035691.Https://Doi.Org/10.1242/Dmm.035691

Lu, P., Chen, J., Chen, M., Wang, L., Xiang, D., Yin, J., & Yang, S. (2023). Case Report: A Rare Homozygous Variation In The ENPP1 Gene, Presenting With Generalised Arterial Calcification Of Infancy In A Chinese Infant. Frontiers In Cardiovascular Medicine, 10, 1105381. Https://Doi.Org/10.3389/Fcvm.2023.1105381

Mori, H., Torii, S., Kutyna, M., Sakamoto, A., Finn, A. V., & Virmani, R. (2018). Coronary artery calcification and its progression: what does it really mean?. *JACC: Cardiovascular Imaging*, *11*(1), 127-142.

Nitschke, Y., Yan, Y., Buers, I., Kintziger, K., Askew, K., & Rutsch, F. (2018). ENPP1-Fc Prevents Neointima Formation In Generalised Arterial Calcification Of Infancy

Through The Generation Of AMP. Experimental & Molecular Medicine, 50(10), 1-12. Https://Doi.Org/10.1038/S12276-018-0163-5

Özkan, S., & Arslan, E. Nursing Management In Invasive Monitoring Of Intracranial Pressure Increase.

Pu, L., Dai, X., Liu, H., Li, L., Zhao, F., & Chen, J. (2022). Prenatal Diagnosis Of Generalised Arterial Calcification Of Infancy In The Second Trimester. Prenatal Diagnosis, 42(12), 15381544. Https://Doi.Org/10.1002/Pd.6245

Ramirez-Suarez, K. I., Cohen, S. A., Barrera, C. A., Levine, M. A., Goldberg, D. J., & Otero, H. J. (2022). Longitudinal Assessment Of Vascular Calcification In Generalised Arterial Calcification Of Infancy. Pediatric Radiology, 52(12), 2329-2341.

Rocha-Singh, K. J., Zeller, T., & Jaff, M. R. (2014). Peripheral arterial calcification: prevalence, mechanism, detection, and clinical implications. Catheterisation and cardiovascular interventions : official journal of the Society for Cardiac Angiography & Interventions, 83(6), E212-E220. https://doi.org/10.1002/ccd.25387

Theng, E. H., Brewer, C. C., Oheim, R., Zalewski, C. K., King, K. A., Delsmann, M. M., Rolvien, T., Gafni, R. I., Braddock, D. T., Jeffrey Kim, H., & Ferreira, C. R. (2022). Characterisation Of Hearing-Impairment In Generalised Arterial Calcification Of Infancy (GACI). Orphanet Journal Of Rare Diseases, 17(1), 273. Https://Doi.Org/10.1186/S13023022-02410-W

Törüner E. , Büyükgönenç L. , 2017 Child Health Basic Nursing Approaches, Ankara Nobel Medical Bookstores, Ankara

Ulusoy, F. R. (2011). Correlation of coronary artery disease risk factors with coronary artery calcification.

Yao, R., Yang, F., Zhang, Q., Yu, T., Yu, Y., Chang, G., & Wang, X. (2023). Clinical And Molecular Characterisation Of A Patient With Generalised Arterial Calcification Of Infancy Caused By Rare ABCC6 Mutation. Journal Of Personalised Medicine, 14(1), 54.

Yildiz, A., Abd, I. H., Guler, K., & Karadag, A. Evaluation of the Relationship Between Coronary Artery Calcification Score and Mortality in Haemodialysis Patients.

Ziegler, S. G., Gahl, W. A., & Ferreira, C. R. (2014). Generalised Arterial Calcification Of Infancy. In M. P. Adam (Eds.) Et. Al., Genereviews®. University Of Washington, Seattle. Https://Rarediseases.Org/Rare-Diseases/Generalised-Arterial-Calcification-Of-Infancy/ NORD

CULTURAL ADAPTATION AND IDENTITY DEVELOPMENT: IMMIGRANT CHILDREN AND ADOLESCENTS

Müge ÇOŞGUN, Şadiye DUR

Chapter 4

Cultural Adaptation And Identity Development: Immigrant Children And Adolescents

MÜGE COŞĞUN[1], ŞADİYE DUR[2]

Introduction

Globalization and increasing migration movements are transforming the demographic structure of societies worldwide. Migration is the process of individuals or groups moving from one place to another due to economic, political, social, or environmental reasons. It is often motivated by the pursuit of better living conditions, educational opportunities, or security (Morrish, 2021). Immigrant children and adolescents face unique challenges in adapting to new cultural environments. During this process, they and their families encounter significant changes that directly impact their identity development and cultural adaptation processes (Umaña-Taylor *et al.*, 2020; Schachner *et al.,* 2024). These processes deeply influence how young people perceive their identities and adapt to their social surroundings. The cultural adaptation processes of migrant youth are crucial for their overall adjustment and psychosocial development (Motti-Stefanidi and Masten, 2020). Berry's (1997) cultural adaptation model emphasizes the necessity for immigrants to maintain their cultural identity while adapting to a new cultural environment (Berry and Georgas, 2009). This bidirectional process plays a significant role in the identity formation of young people. Erikson's (1968) theory of identity development indicates that adolescence is a critical period for identity exploration and formation (Erikson, 1968). In this context, the processes through which migrant youth develop both their ethnic and national identities have a decisive impact on their overall identity development and adaptation (Schachner *et al.,* 2024).

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Cultural Adaptation and Identity Development Processes in Immigrant Children and Adolescents

Cultural adaptation refers to the process by which individuals adapt to a new cultural environment. This process includes the ability to adapt to new cultural norms, values, and behaviors (Motti-Stefanidi and Masten, 2020; Lau and Rodgers, 2021). Identity development, on the other hand, is the process by which an individual recognizes, interprets, and positions themselves within a social context. According to Erikson's psychosocial development theory, adolescence is a critical transition period between identity confusion and identity achievement. Identity formation is a significant developmental task throughout life and is particularly prominent during the developmental period of adolescence (Erikson, 1968). Identities are multifaceted and encompass various dimensions that come together to define the self. Social identities refer to the dimensions of identity derived from membership in specific social groups (Haslam *et al.*, 2021). Social identities can include race, ethnicity, political affiliation, and gender. A relatively less studied social identity that concerns all youth is national identity, reflecting the individual's "subjective or internalized sense of belonging to a nation" (Umaña-Taylor *et al.,* 2020).

For immigrant children and adolescents, cultural adaptation requires integrating into the new and unfamiliar environment they encounter in both their educational and social lives (Maehler *et al.*, 2021). Immigrant children develop and establish identities with the host culture or country. Simultaneously, identity development includes efforts to form a bicultural identity, preserve their cultural identity, and acquire a new cultural identity. Studies with immigrant children have shown that they simultaneously undergo a two-way process: enculturation, the process of socializing in their own culture and learning and adapting to their ethnic culture, and acculturation, the process of learning and adapting to the host culture (Crocetti *et al.*, 2024). Enculturation is largely shaped by family connections, while acculturation is primarily influenced by interactions with peers from the ethnic majority group at school (Aral *et al.,* 2024). Similar to identity formation, the formation of peer relationships is also a significant developmental task of adolescence and has important implications for young people's adjustment (Umaña-Taylor *et al.,* 2020). For immigrant youth, peer relationships serve both developmental and cultural adaptation purposes, and forming positive relationships with peers from both their own and different ethnic groups has significant implications for their adjustment (Suárez-Orozco *et al.,* 2018). Given the importance of peer relationships during this developmental period, peers can play a critical role in the national identity development of adolescents. Immigrant children who interact with both their own culture and the adopted culture develop both ethnic and national identities (Crocetti *et al.,* 2024). The importance of the social context in which immigrant children's identities develop as a result of their ethnic origins and connections with the host culture cannot be overlooked. Identities vary according to social relationships, interactions, and ethnic environments (Juang *et al.,* 2024).

Based on cultural socialization models (Berry and Georgas, 2009), heritage culture and intercultural learning can promote both enculturation (socialization in one's own culture) and acculturation (socialization in another culture) and are linked to identity development (Crocetti *et al.,* 2024). For example, students' interactions with cultural norms and traditions in their families provide an opportunity to explore their families' cultural backgrounds while also helping them learn about the cultural backgrounds of other students in the classroom, which can aid in their personal and cultural identity development. In this context, greater support for heritage culture and intercultural learning is associated with stronger and more stable cultural identity processes (Schachner *et al.,* 2016; Juang *et al.,* 2023). Literature reviews reveal that studies conducted with both migrant and non-migrant children and adolescents show that when they perceive greater support for cultural pluralism in their schools, they exhibit a greater increase in the exploration and resolution of their ethnic-racial and cultural identities

(Camacho *et al.,* 2018; Schachner *et al.,* 2024).

Barriers to Cultural Adaptation and Identity Development

Immigrant children and adolescents strive to balance their heritage cultures with the cultures of their new societies during the cultural adaptation process. This process can be further complicated by challenges such as language barriers, discrimination, and exclusion. One of the most significant challenges faced by immigrant children and adolescents is language barriers. Learning a new language can be a major factor that hinders success in both education and social life (Pergert and Tiselius, 2020). Language barriers can negatively impact the academic success of these young people and lead to social isolation (Beltrán-Velasco *et al.,* 2020).

Additionally, discrimination and exclusion are other major challenges that immigrant children and adolescents face. Migrants may experience discrimination based on ethnic, religious, or cultural differences in the societies where they live (Perreira and Ornelas, 2011). This can lead to a decrease in self-esteem, and mental health issues such as depression and anxiety (Beltrán-Velasco *et al.*, 2020; Perreira and Ornelas, 2011; Rafieifar and Macgowan, 2022).

Adapting to the educational system is also a significant challenge for immigrant children and adolescents. Adapting to different educational systems can negatively affect academic performance (Beltrán-Velasco *et al.,* 2020). These young people may struggle to establish themselves in new school environments and form friendships (Umaña-Taylor *et al.*, 2020). Finally, the migration process can also affect family dynamics. Immigrant families may experience role conflicts within the family while trying to adapt to new living conditions (Karoly and Gonzalez, 2011). Parents' working conditions and economic difficulties can increase the pressure on children and cause tensions in family relationships (Van Hook and Glick, 2020). These challenges complicate the identity development and cultural adaptation processes of migrant children and adolescents, making it essential to provide support during these processes. It is crucial for educators and health professionals to understand these challenges and provide appropriate interventions to support immigrant children and adolescents.

Conclusion

Migration is a global phenomenon that affects more countries each year. The adaptation of migrant youth is a significant indicator of how well migrants are integrated into society. Given that peer relationships and identity formation are important developmental competencies during adolescence, it is essential to understand how adolescents develop their national identities and friendships. The cultural adaptation and identity development of immigrant children and adolescents are influenced by many complex and dynamic processes. These processes involve interactions with both their ethnic heritage cultures and the host culture. Identity development is shaped by the convergence of these two processes and deeply influences how young people perceive who they are. In this context, schools and peer groups play a significant role in the development of the national and ethnic identities of migrant youth. Specifically, support for cultural pluralism in schools is thought to help and strengthen the cultural adaptation and identity development of children and adolescents.

Cultural adaptation and identity development are critical for immigrant children and adolescents. Successful interventions in this process include programs that support language learning and education that increases cultural awareness. Psychosocial support services can help children overcome social isolation and cope with traumatic experiences. At the same time, the cultural sensitivity of educators and health professionals should be increased, and counseling services should be provided to migrant families. These comprehensive approaches, emphasizing empathy, patience, and understanding, support the healthy identity development and societal adaptation of migrant children and adolescents.

In conclusion, the identity development of immigrant children and adolescents is a multidimensional process supported by both their families and schools. In this process, the recognition and support of cultural pluralism and different cultural backgrounds can help young people develop their identities more robustly and healthily. Therefore, educational policies and practices should increase opportunities for intercultural learning and promote cultural pluralism to support cultural adaptation and identity development. Understanding and supporting the identity development processes of migrant youth will contribute to their better integration into society and the development of a stronger sense of identity.

References

Aral, T., Juang, L. P., Schwarzenthal, M., Schachner, M. K., & Adams, B. G. (2024). The social contexts of cultural identity among adolescents of immigrant descent: Separate and interacting relations of family and school ethnic-racial socialization. The Journal of Early Adolescence, 02724316241251401.

Beltrán-Velasco, A. I., Mendoza-Castejón, D., Fuentes-García, J. P., & Clemente-Suárez, V. J. (2020). Behavioural, psychological, and physiological stress markers and academic performance in immigrant and non-immigrant preschool and school students. Physiology & Behavior, 225, 113081.

Berry, J. W., & Georgas, D. (2009). An ecocultural perspective on cultural transmission: The family across cultures. In U. Schönpflug (Ed.), Cultural transmission: Psychological, developmental, social, and methodological aspects (pp. 95–125). Cambridge University Press.

Camacho, T. C., Medina, M., Rivas-Drake, D., & Jagers, R. (2018). School climate and ethnic-racial identity in school: A longitudinal examination of reciprocal associations. Journal of Community & Applied Social Psychology, 28(1), 29–41. https://doi.org/10.1002/casp.2338

Crocetti, E., Karataş, S., Branje, S., Bobba, B., & Rubini, M. (2024).Navigating across heritage and destination cultures: How personal identity and social identification processes relate to domainspecific acculturation orientations in adolescence. Journal of Youth and Adolescence, 53(2), 397–415. https://doi.org/10.1007/ s10964-023-01870-y.

Erikson, E. H. (1968). Identity: youth and crisis. New York, NY: Norton.

Haslam, C., Haslam, S. A., Jetten, J., Cruwys, T., & Steffens, N. K. (2021). Life change, social identity, and health. Annual Review of Psychology, 72(1), 635-661.

Juang, L. P., Schwarzenthal, M., & Schachner, M. K. (2024). Heritage culture and national identity trajectories: Relations to classroom cultural diversity climate and socioemotional adjustment for adolescents of immigrant descent. Zeitschrift für Erziehungswissenschaft, 27(1), 63-87.

Karoly, L. A., & Gonzalez, G. C. (2011). Early care and education for children in immigrant families. *The Future of Children*, 71-101.

Lau, L. S., & Rodgers, G. (2021). Cultural competence in refugee service settings: a scoping review. Health equity, 5(1), 124-134.

Maehler, D. B., Daikeler, J., Ramos, H., Husson, C., & Nguyen, T. A. (2021). The cultural identity of first-generation immigrant children and youth: Insights from a meta-analysis. Self and Identity, 20(6), 715-740.

Morrish, I. (2021). The background of immigrant children. Routledge.

Motti-Stefanidi, F., & Masten, A. S. (2020). Immigrant youth resilience: Integrating developmental and cultural perspectives. Contextualizing immigrant and refugee resilience: Cultural and acculturation perspectives, 11-31.

Pergert, P., & Tiselius, E. (2020). Intercultural competence and communication over language barriers. Ethical Issues in Pediatric Hematology/Oncology, 203-222.

Perreira, K. M., & Ornelas, I. J. (2011). The physical and psychological well-being of immigrant children. The Future of Children, 195-218.

Rafieifar, M., & Macgowan, M. J. (2022). A meta-analysis of group interventions for trauma and depression among immigrant and refugee children. Research on Social Work Practice, 32(1), 13-31.

Schachner, M. K., Hölscher, S., Moscardino, U., Ceccon, C., Juang, L., & Pastore, M. (2024). Adolescent cultural identity development in context: The dynamic interplay of the Identity Project with classroom cultural diversity climate in Italy and Germany. Journal of Youth and Adolescence, 1-19.

Schachner, M. K., Noack, P., van de Vijver, F. J. R., & Eckstein, K. (2016). Cultural diversity climate and psychological adjustment at school – Equality and inclusion versus cultural pluralism. Child Development, 87(4), 1175–1191. https://doi.org/10.1111/cdev.12536.

Suárez-Orozco, C., Motti-Stefanidi, F., Marks, A., & Katsiaficas, D. (2018). An integrative risk and resilience model for understanding the adaptation of immigrant-origin children and youth. American Psychologist, 73(6), 781.

Umaña-Taylor, A. J., Kornienko, O., McDermott, E. R., & Motti-Stefanidi, F. (2020). National identity development and friendship network dynamics among immigrant and non-immigrant youth. Journal of youth and adolescence, 49, 706-723.

Van Hook, J., & Glick, J. E. (2020). Spanning borders, cultures, and generations: A decade of research on immigrant families. *Journal of Marriage and Family*, *82*(1), 224-243.

COMPLIANCE WITH THE TREATMENT PROCESS IN CHILDREN DIAGNOSED WITH BETA THALASSEMIA MAJOR

Aybike Şaşmaz, Atiye KARAKUL

Chapter 5

Compliance with the Treatment Process in Children Diagnosed with Beta Thalassemia Major

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INTRODUCTION

Beta Thalassemia Major (BTM) is defined as "an autosomal recessive disease characterized by abnormal synthesis of β chains in hemoglobin" (Büyükgönenç & Törüner, 2013). It is characterized by the inability to synthesize one or more of the globin chains at the basis of the hemoglobin molecule, or by their low amount (Kılınç, 2011). The most common thalassemia types are α and β thalassemias. Although anemia is the most prominent feature, the disease can be very mild or very severe depending on the heterozygousand homozygous type.

The most severe thalassemia type is Thalassemia Major (Yaprak, 2004; Borgna-Pignatti & Gamberini, 2011). Children with BTM have severe anemia, growth retardation, hepatoslenomegaly,

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bone deformities and are also dependent on erythrocyte transfusion. In addition, cardiac, endocrine, musculoskeletal, hepatic complications and infections may develop due to iron overload (Canatan & Aydınok, 2007). The cause of morbidity in thalassemia is usually heart failure due to iron overload, serious infections or splenectomy complications (Sönmezoğlu, 2010). Viral infections transmitted by blood transfusion (especially hepatitis B and C), infections caused by iron overload and infections developing after splenectomy constitute the second most common cause of morbidity in thalassemia patients (Vento, Cainelli & Ceasrio, 2006). Therefore, in today's societies where adequate health care is provided, the life expectancy of children diagnosed with thalassemia is prolonged until adulthood and the prognosis is good. Therefore, it is imperative to provide the necessary nursing care for children with BTM to adapt to the treatment process in order to reduce the morbidity and mortality rate (Şenol & Tavşanlı, 2015; Karakul, 2019).

EPIDEMIOLOGY

Hemoglobin disorders are a major problem affecting more than half of the countries in the world. According to World Health Organization data, the prevalence of thalassemia and abnormal hemoglobin carriers in the world is 5.1% and there are approximately 266 million carriers. It is seen equally in both sexes (Canatan, 2010; 2014)

Table 1. Clinical Classification of Thalassemias

Silent transporters	Hematologic findings are normal
Thalassemia minor (α or β)	Microcytosis and hypochromia with mild anemia
Hb H disease (α-thalassemia)	Moderate hemolytic anemia, jaundice and splenomegaly
Hidrops fetalis (α - talasemi)	In utero death due to severe anemia
Thalassemia intermedia	No need for regular transfusions
Thalassemia major	Severe anemia, growth retardation, hepatoslenomegaly, bone deformities, transfusion dependent

CLINICAL FINDINGS

Clinical signs of BTM appear as early as the third month of life. In the second half of life, anemia is observed and in addition to this finding, symptoms related to anemia become more pronounced. (Canatan & Aydınok, 2007; Törüner & Büyükgönenç, 2012).

The skin is dark yellow due to the accumulation of hemosiderin in the skin.

Heart, fibrotic changes occur in the myocardium due to hemochromatosis due to prolonged transfusion. Chronic anemia, increased cardiac load, pericarditis, heart failure, Splenomegaly due to fibrotic tissue formation in the spleen, Liver, cirrhosis due to fibrotic tissue formation, increased

iron content in the liver,
gallstones,
Insulin-dependent diabetes mellitus due to fibrotic tissue formation in the pancreas,
Lymph nodes, enlarged lymph nodes in the abdominal area or anywhere else in the body,
Endocrine system, sexual development is delayed due to chronic anemia. Secondary sex characteristics rarely develop.Growth retardation, hypoparathyroidism, hypothyroidism,
The skeletal system, frontal and parietal bones are prominent. Growth of the cheek and maxillary bone, protrusion of the upper lip and malocclusion. Mongoloid appearance in the eyes and collapse of the nasal root are observed (Çavuşoğlu, 2013).

Complications related to iron accumulation may develop in children with transfusion-dependent BTM.

- Pituitary > Growth disorder
- In the liver > Cirrhosis
- Pancreas > Diabetes mellitus,
- Heart > Cardiomyopathy, Heart failure
- Gonads > Hypogonatism, Infertility

Currently, clinical symptoms are observed milder in patients with BTM who receive erythrocyte suspension transfusions and iron chelation therapy in a timely and appropriate dose (Canatan & Aydınok, 2007).

Children with BTM have difficulty in adapting to the treatment process because they are dependent on tranfusion. Accordingly, anxiety, low self-esteem, hopelessness and depression may be observed in children with BTM (Karakul & Şenol, 2018; Karakul, 2019; Mardhiyah et al., 2022; Jaafari et al., 2022).

DIAGNOSIS AND TREATMENT METHODS

Treatment of BTM includes lifelong regular erythrocyte transfusion and iron chelation therapies. In addition, treatment and care of complications that occur as a result of excessive accumulation of iron due to the treatment process are also included (Canatan, 2010; Aydınok, 2010).

Erythrocyte Suspension Transfusion

It is performed to increase the circulating Hb level and to provide oxygenation of the tissue. The average Hb level in children with BTM should be 9.5 g/dl. Patients receive ERT approximately every three weeks. Since erythrocytes are deficient in transfusion-dependent thalassemia, erythrocyte suspension is given. Regular transfusion corrects anemia and prevents enlargement of the bone marrow (nasal root depression, forehead and chin protrusion) and enlargement of the spleen and liver (Karakaş, 2010).

In appropriate ERT, the patient's ABO and Rh groups (and subgroups if possible) must be appropriate, the patient must not have waited more than seven days, and viral markers (HBV, HCV, HIV) must be negative (Yaprak, 2004).

Leukocyte-poor erythrocyte suspensions should be used in transfusion. It is recommended to use filters during filtration or transusion before storage and washed erythrocytes in patients with severe allergic reactions (Karakaş, 2010). During transfusion, the individual should be observed in terms of transfusion reactions. Transfusion should be planned so as not to interfere with the individual's school status, working hours and daily activities (Şenol & Tavşanlı, 2015; Karakul & Şenol, 2018).

Chelation Therapy

"Iron chelation is initiated after the first year of regular transfusion or after 12-15 transfusions or when the serum ferritin level reaches 1000 µg/L (ng/mL)" (Ağaoğlu, 2010). In recent years, oral chelators, which are much easier to use and have greater efficacy on cardiac iron, have been used. In this way, it will be easier for children with BTM to adapt to the treatment process and increase the quality of life (Ağaoğlu, 2010).

- Desferrioxamine (Desferal®, DFO) is administered as subcutaneous infusion via a portable pump at a dose of 30-40 mg/kg/day, 5-7 times a week for 8-12 hours. Desferal can also be given IV. After growth is completed, the maximum dose can be increased to 50-60 mg/kg. High frequency hearing loss may occur due to infusion. Audiometry should be performed routinely. In addition, localerythema and painful subcutaneous nodules may be observed at the site of infusion (Aydınok, 2010; Aydoğmuş, 2012).

- Deferiprone (Ferriprox®, DFP) has been used as a licensed iron chelator in India since 1994, while it was started to be used clinically in our country in 2004. Studies have shown that the combined use of DFP with DFO removes iron load from the body more effectively (Origa et al., 2005; Peng et al., 2006). The most serious side effect of deferiprone is agranulocytosis, nausea and vomiting (Aydoğmuş, 2012).

- Deferasirox (Exjade®, DFX) was introduced in 2005 as an iron chelator in patients over 2 years of age. Since 2006, it has been used in our country. The recommended starting dose is 20mg/kg/day to maintain iron load and 30mg/kg/day to maintain negative iron balance. In cases with severe iron accumulation, the dose can be increased up to 40 mg/kg/day. The effect of the drug is controlled by serum ferritin levels. The most common side effects are gastrointestinal disorders and skin rash (Aydınok, 2010).

ADAPTATION OF THE CHILD WITH BTM TO THE TREATMENT PROCESS AND NURSING MANAGEMENT

Nursing management in BTM starts with informing the parents about the disease process after the diagnosis is made because the disease is genetically inherited. Roles of the pediatric nurse in the care of the child with Beta Thalassemia;

1. Early diagnosis
2. Preparation of the child and parents for diagnostic procedures
3. Administration of transfusion therapy
4. Treatment to remove iron from the body
5. Preparation of the child for the surgical procedure (at the time when splenectomy should be performed)
6. Prevention of infection development
7. Monitoring of complications
8. Support and education of the child and parents.

Early diagnosis should include knowing the genetic history of the child and family, being alert to the signs and symptoms of the disease, and referring the family to higher level health centers for further examination and treatment.

The child and parents should be prepared for diagnostic methods, laboratory tests and X-ray procedures should be explained to the family and child in a clear and understandable way beforehand, and the child and parents should be supported during these procedures.

Transfusion therapy is administered when the Hb level is 9.5 gr/dL or higher.

Before transfusion, cross match and new antibody screening are checked. Erythrocyte suspensions are used in transfusion and care must be taken to use a filter. If the patient has had severe allergic reactions, it is important to use washed erythrocytes.

Since transfusions will be performed every two to five weeks, transfusion times should be planned so as not to interfere with the child's daily activities and school status.

It is necessary to prepare the child and parents for the surgical procedure (at the time when splenectomy is to be performed). In the preoperative period, necessary information (such as visual and auditory materials/videos) is given according to the age and educational status of the child and family.

In the postoperative period, it is important to control pain, bleeding and infection in the operation area and to monitor fluid-electrolyte balance. Since infection may be seen in the child after splenectomy, the family should be educated on issues such as protection from infection, symptoms if it develops, and management. Oral administration of vitamin C to children with BTM (because it increases iron excretion) is one of the effective methods to protect against infection. Hepatitis B and pneumococcal vaccines should also be administered. Penicillin should be used for prophylaxis after splenectomy. Nurses are expected to pay attention to the symptoms of cholecystitis since the incidence of cholecystitis is high in these children during school age and adolescence.Observation of complications is very important for patients with BTM. Nurses are professional caregivers who play a role in preventing complications such as transfusion reactions, hemosiderosis, cholelithiasis, cirrhosis, infection, growth retardation, cardiac problems (such as pericarditis), diabetes mellitus, delayed puberty. In addition, in order to prevent fractures due to osteoporosis in later ages, trainings on daily activities and exercises of the patient should be provided. Support and education of the child and parents should be planned in line with the principles of family-centered care. Parents may feel guilty because it is a genetically inherited disease. Nurses can provide emotional support by encouraging parents to express their feelings and providing education about the disease process. The chronic nature of the disease may cause parents to exhibit an overly protective attitude towards their children. This attitude leads to over-dependence on the family and social maladjustmentin children. The nurse can support the child by communicating with the child to solve this problem. They can also help the child socialize by introducing him/her to other children like him/her or by directing him/her to summer schools.

Since the physical appearance of children with BTM is different from healthy children, their body image and self-esteem may be negatively affected. They may experience social isolation due to changes in facial appearance, slow development and delayed puberty. Children should be encouraged to express their feelings and thoughts about these differences. The nurse is a guiding identity for the child to set realistic goals for his/her life (Şenol & Tavşanlı, 2015; Karakul & Şenol, 2018; Karakul, 2019; Elsoudy, Madinay, & Yonis Mahrous, 2022; Jaafari et al., 2022).

CONCLUSION

Compliance with the treatment process is very important to improve the quality of life of children with BTM who need continuous blood transfusion. With the adaptation of children with BTM to the treatment process, it is possible that anxiety and depression levels will decrease, stress coping mechanisms will improve,

academic success will increase and future anxiety will decrease.

In addition, children's social relationships will be positively affected.

Therefore, the stigmatization that children with BTM are exposed to will decrease. Accordingly, possible health problems that may be seen in children with BTM can be prevented and quality of life will increase.

References

Agaoglu, L. (2010). Life in Thalassemia. Turkiye Klinikleri Journal of Hematology Special Topics, 3(1), 9-13

Aydınok, Y., Oymak, Y., Atabay, B., Aydoğan, G., Yeşilipek, A., Ünal, S., ... & Evim, M. S. (2018). A National Registry of Thalassemia in Turkey: demographic and disease characteristics of patients, achievements, and challenges in prevention. Turkish Journal of Hematology, 35(1), 12-18

Aydinok, Y. (2010). Chelation Therapy in Thalassemia. Turkiye Klinikleri Journal of Hematology Special Topics, 3(1), 76-79.

Aydoğmuş, İ.G. (2012). Factors affecting quality of life in patients with beta thalassemia major. Specialization Thesis. Dr. Behçet Uz Child Diseases and Surgery Training and Research Hospital, Izmir.

Borgna-Pignatti, C., & Gamberini, M. R. (2011). Complications of thalassemia major and their treatment. Expert review of hematology, 4(3), 353-366.

Canatan, D, & Aydinok, Y. (2007). Thalassemia and hemoglobinopathies. Diagnosis and treatment. Antalya: Retma Matbaa, 29-34.

Canatan, D. (2010). The status of thalassemia and hemoglobinopathies in the world and in Turkey. Türkiye Klinikleri J Hem Onc-Special Topics, 3(1), 1-4.

Canatan, D. (2014). Epidemiology of hemoglobinopathies in Turkey. Hematologist, 4, 11-22.

Cavusoglu, H. (2011). Child health nursing. Expanded 10th Edition. Ankara: Sistem Ofset Basımevi, 210-214.

Elsoudy, S. F., Madinay, N., & Yonis Mahrous, E. S. (2022). Compliance of Children with Thalassemia to Their Therapeutic Regimen. International Egyptian Journal of Nursing Sciences and Research, 2(2), 168-182.

Jaafari, Z., Sadidi, N., Abdolahinia, Z., & Shahesmaeili, A. (2022). Prevalence of Depression among Iranian Patients with Beta-Thalassemia Major: A Systematic Review and Meta-analysis. Iranian Journal of Medical Sciences, 47(1), 15.

Karakaş, Z. (2010). Transfusion therapy in thalassemia. Turkiye Klinikleri Journal of Hematology Special Topics, 3(1), 50-57.

Karakul, A. (2019). Empowerment of Children with Beta Thalassemia Major. Doctoral Thesis, Ege University Institute of Health Sciences, Izmir.

Karakul, A., & Şenol S. (2017). Reflections of medical technology from past to present on nursing care: Beta Thalassemia example. Izmir Kâtip Çelebi University Journal of Faculty of Health Sciences, 2(1)(Supp 1), 12-13

Karakul, A., & Senol S. (2018). Care in Beta Thalassemia Major. In: Pediatrics with Cases. Senol S, editor. Ankara: Akademisyen Tıp Kitabevi.

Kılınç, Y. (2011). Hemoglobin diseases: Thalassemia. In: Pediatric hematology. Anak S.S, Aydoğan G, Çetin M, İrken G, Kemahlı S, Öztürk G, Yeşilipek MA, editors. Istanbul: Istanbul Medical Bookstore.

Mardhiyah, A., Mediani, H. S., Panduragan, S. L., & Yosep, I. (2022).

Hope among adolescents with Thalassemia in Indonesia: A Cross-Sectional Study.KnE Life Sciences, 175-184.

Origa, R., Bina, P., Agus, A., Crobu, G., Defraia, E., Dessì, C., ... & Galanello, R. (2005). Combined therapy with deferiprone and desferrioxamine in thalassemia major.Haematologica, 90(10), 1309-1314.

Peng, C. T., Wu, K. H., Wu, S. F., Liang, D. C., Yang, C. P., Jang, R. C., ... & Hsiao, C. C. (2006). Deferiprone or Deferoxamine vs. Combination Therapyin Patients with β-Thalassemia Major:A Case Studyin Taiwan.Hemoglobin, 30(1), 125-130.

Sonmezoglu, M. (2010). Infections and management in thalassemia.Turkiye Klinikleri Journal of Hematology Special Topics, 3(1), 96-101.

Şenol, S.,& Tavşanlı, N. G. (2015). Hereditary blood diseases:Pediatric care in the case of Sickle Cell Anemia, Beta-Talassemia, Hemophilia.Turkiye Clinics Journal of Pediatric Nursing-Special Topics, 1(3), 67-73.Törüner, K.E., & Büyükgönenç, L. (2012).Basic Nursing Approaches to Child Health.Ankara: Göktuğ Publishing, 812-815.

Vento, S., Cainelli, F, Cesario, F. (2006). Infections and thalassaemia.Lancet Infect Dis, 6, 226- 33

Yaprak, I. (2004). Current approaches in the diagnosis and treatment of beta thalassemia.Sted, 13(2), 58-59.

NURSING APPROACH IN GERIATRIC EMERGENCY CASES

Aren GURGİL, Dilek KIYMAZ

Chapter 6

Nursing Approach in Geriatric Emergency Cases

Aren GÜRGİL[1], Dilek KIYMAZ[2]

1. Introduction

With the increasing proportion of the elderly population worldwide and in our country, there is a rise in emergency care needs and emergency department admission rates among older individuals [1]. The World Health Organization (WHO) considers individuals aged 65 and over as elderly and classifies them in the geriatric category [2]. Geriatric emergency cases refer to conditions and symptoms frequently encountered in individuals over 65 years of age, presenting with atypical symptoms in clinical course, but not fully explained, negatively affecting the patient's quality of life and increasing morbidity and mortality rates [3].

The elderly population may be more susceptible and sensitive to certain conditions due to inadequacies that occur with the natural process of aging and the decrease in physical and cognitive functions. In the emergency clinical picture, cases frequently encountered in geriatric patients, such as cardiovascular diseases, neurological problems, endocrine and metabolic diseases, trauma, polypharmacy, sepsis, fluid-electrolyte imbalances, can cause poor prognosis of the existing chronic disease in the elderly patient [4].

Emergency department admissions of geriatric patients can lead to a decrease in their health levels, quality of life, and independence status [5]. Due to chronic and comorbid diseases of elderly patients, nurses may face difficulties in providing care for patients in emergency departments [6]. A comprehensive geriatric assessment significantly affects the decisions to be made regarding the treatment of elderly individuals, the

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correct diagnosis, their health levels, and care [5]. A comprehensive geriatric assessment requires a multidisciplinary team approach [7].

In this regard, nurses who actively work 24 hours in emergency departments make a significant contribution to the early identification and evaluation of geriatric emergency cases, the correct management of symptoms and complications that may arise, and the recovery and discharge processes [3, 8].

2. Evaluation of Geriatric Cases in the Emergency Department

By taking a detailed history from geriatric patients who present to the emergency department and using effective physical examination methods, nurses will prevent the oversight of atypically progressing signs and symptoms [9]. Taking a medical history from geriatric patients in emergency departments is quite difficult. The medical history information taken by recognizing the cognitive and physical inadequacies of the patients should be confirmed with relatives and old records. The history of multiple drug use, comorbid disease, and trauma in patients should be carefully questioned. Physiological changes in old age require a more careful physical examination [10].

3. Geriatric Cases in Emergency Departments

3.1. Changes in Mental Status

Delirium or dementia patients constitute 30-40% of patients who come to the emergency department with changes in mental status. Both dementia and delirium may present to the emergency department with complaints of disorientation, paranoia, hallucinations, emotional instability, and sleep disorders. Of these two different syndromes, delirium starts acutely and is accompanied by confusion [11]. In addition, if the diagnosis and treatment process does not progress quickly, delirium causes a significant increase in morbidity and mortality rates in elderly patients. In this regard, early detection of delirium in emergency departments can improve prognosis [12].

3.2. Trauma

Trauma ranks 5th among the causes of death in geriatric patients. The change in the physiological response to trauma in old age, along with increased comorbidities and decreased physiological reserve, increase geriatric mortality rates [13]. Due to increasing emergency department admissions and high mortality, geriatric trauma cases constitute an important and difficult case group for healthcare professionals [14].

3.3. Sepsis

Elderly patients constitute 65% of sepsis patients. Sepsis progresses more fatally in geriatric patients due to the presence of comorbid diseases. The main reason is the weakening of the immune system with the increase in fragility in the elderly [15]. Geriatric patients with sepsis present with atypical complaints, making it difficult to diagnose sepsis. The fever response in case of infection is blunted. General deterioration or decrease in functional capacity (increased confusion, falls, anorexia) may indicate sepsis [15].

3.4. Falls

Falls are among the geriatric emergency cases that are frequently encountered in the elderly and can cause mortality and morbidity. According to World Health Organization data, falls occur in approximately 28-35% of individuals aged 65 and over each year, and 40% of falls result in mortality [16]. In a study conducted in England (2016) on patients aged 60 and over (n=4301), the frequency of falls was found to be 28.4%, and it was determined that falls were more common in women [17].

3.5. Polypharmacy

Both prescription and over-the-counter drug use in the geriatric age group is much higher than in the general population. The increase in the prevalence of chronic diseases in elderly individuals also brings along multiple drug use (polypharmacy) [18]. In the literature, it has been determined that the vast majority of individuals aged 65 and over have at least one chronic disease, and 70% use five or more drugs for their treatments [19, 20, 21].

3.6. Fluid-Electrolyte Imbalances

With aging, some changes occur in fluid and electrolyte balances. Fluid and electrolyte imbalances are one of the important problems seen in geriatric patients presenting to emergency departments. Elderly patients may become dehydrated due to problems such as increased ambient temperature, febrile illness, or diarrhea. Dehydration and hypernatremia can be observed more prominently in patients with significant neurological deficits [22].

3.7. Abdominal Pain

Due to physiological responses that change with aging and accompanying additional diseases, the emergency department management of patients aged 65 and over with abdominal pain complaints is a complex process. In geriatric patients, the number of examinations, tests, consultations needed for a definitive diagnosis, and treatments that need to be given in the emergency department are higher than in patients in other age groups [23].

Conclusion

The frequency of emergency admissions of geriatric patients is quite high compared to other age groups due to various physical, cognitive disorders, and many reasons related to aging. In this regard, early diagnosis of cases is provided with a comprehensive geriatric patient assessment by nurses in the emergency department. It is thought that emergency nurses being careful about possible risks in geriatric cases will contribute to patients receiving quality care and their recovery processes. There are limited studies in the literature on nursing approach in geriatric emergency cases. For this purpose, it is thought that it will contribute to the literature on the problems experienced by geriatric emergency cases, which constitute a large population in the emergency department, and emergency nursing approach.

References

Bektaş, H. (2023). General Concepts in Geriatric Emergency Approach and Nursing Interventions in the Field. *Turkiye Klinikleri Public Health Nursing-Special Topics*, 9(1), 1-6.

World Health Organization (WHO). (2021). Global Health and Aging. Retrieved from https://www.who.int/ageing/publications/global_health.pdf

Düzgün, G., Çınar, D., & Türeyen, A. (2020). A Situation Requiring Knowledge and Awareness in Emergency Nurse: Evaluation of Geriatric Syndromes. *Turkiye Klinikleri Journal of Nursing Sciences*, 12(2), 280-290.

Kaldırım, U., Eroğlu, M., Durusu, M., Yıldırım, A. O., Tuncer, S. K., Eyi, Y. E., et al. (2015). The evaluation of mental status of elderly patients presenting to emergency services and the comparison between the last diagnosis and their complaints. *Bulletin of Clinical Psychopharmacology*, 25(1), 2-8.

Gül, E., & Erci, B. (2023). The Importance of Nursing Diagnosis in Geriatric Emergencies and Diagnostic Methods. *Turkiye Klinikleri Public Health Nursing-Special Topics*, 9(1), 34-38.

Alvis, B. D., & Hughes, C. G. (2015). Physiology Considerations in the Geriatric Patient. *Anesthesiology Clinics*, 33(3), 447-456.

Demircan, A. (2019). Approach and Evaluation to Geriatric Patient. In: Geriatric Emergencies, Ed: Demircan A. 1st Edition. Ankara: Türkiye Klinikleri, 1-4.

Bulduk, S., Çetin, H., & Usta, E. (2015). Is Person-Centered Approach Possible in Emergency Care of the Elderly? *Journal of Academic Research in Nursing*, 1(1), 45-50.

Savaş, S., & Akçiçek, F. (2010). Comprehensive geriatric assessment. *Ege Journal of Medicine*, 49(3), 19-30.

Southerland, L. T., Vargas, S. J., Nagaraj, L., Güre, T. R., & Caterino, J. M. (2018). An Emergency Department Observation Unit Is a Feasible Setting for Multidisciplinary Geriatric Assessments in Compliance With the Geriatric Emergency Department Guidelines. *Academic Emergency Medicine*, 25(1), 76-82.

Kennedy, M., Hwang, U., & Han, J. H. (2020). Delirium in the Emergency Department: Moving From Tool-Based Research to System-Wide Change. *Journal of the American Geriatrics Society*, 68(5), 956-958.

Han, J. H., Zimmerman, B. A., Cutler, N., Schnelle, J., Morandi, A., Dittus, R. S., et al. (2009). Delirium in older emergency department patients: recognition, risk factors, and psychomotor subtypes. *Academic Emergency Medicine*, 16(3), 193-200.

Konda, S. R., Lack, W. D., Seymour, R. B., & Karunakar, M. A. (2015). Mechanism of Injury Differentiates Risk Factors for Mortality in Geriatric Trauma Patients. *Journal of Orthopaedic Trauma*, 29(7), 331.

Fidan, S., Kurtoglu Celik, G., Özhasenekler, A., Şener, A., Tanrıverdi, F., Pamukçu Günaydın, G., et al. (2020). Evaluation of Revised Trauma Score in Geriatric Trauma Patients. *Ankara Medical Journal*, 20(3), 578-587.

Kılıçaslan, İ. (2019). Sepsis in Geriatric Patients. *Turkiye Klinikleri Emergency Medicine-Special Topics*, 5(2), 51-60.

World Health Organization. (2007). WHO Global Report on Falls Prevention in Older Age.

Gale, C. R., Cooper, C., & Sayer, A. A. (2016). Prevalence and risk factors for falls in older men and women: The English Longitudinal Study of Ageing. *Age and Ageing*, 45(6), 789-794.

Richard, D., Shih, M. D., Christopher, R., et al. (2022). Balancing vision with pragmatism: The geriatric emergency department guidelines-realistic expectations from emergency medicine and geriatric medicine. *Journal of the American Geriatrics Society*, 70, 1368-1373.

O'Mahony, D., O'Sullivan, D., Byrne, S., O'Connor, M. N., Ryan, C., & Gallagher, P. (2014). STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age and Ageing*, 44(2), 213-218.

Steinman, M. A., Beizer, J. L., DuBeau, C. E., Laird, R. D., Lundebjerg, N. E., & Mulhausen, P. (2015). How to use the American Geriatrics Society 2015 Beers Criteria—a guide for patients, clinicians, health systems, and payors. *Journal of the American Geriatrics Society*, 63(12), e1-e7.

Varışlı, B., Doğan, F., & Yiğitbaş, M. (2018). Clinical, Demographic and Cost Analysis of Geriatric Age Group Patients Admitted to Emergency Department. *Anatolian Journal of Emergency Medicine*, 1(2), 18-24.

Erden, İ. A., Kara, D., Ayhan, B., & Uzun, Ş. (2012). Geriatric patient and intensive care. *Academic Geriatrics*, 3(4), 115-119.

Kostak, M. D., Durak, V. A., Özdemir, F., et al. (2014). Comparison of patients aged 45-64 years and 65 years and older who presented to the emergency department with abdominal pain and evaluation of the relationship between their diagnoses and physiological changes. *Journal of Uludağ University Faculty of Medicine*, 43(1), 7-12.

IMPACT OF PREGNANCY ON THE PELVIC FLOOR AND THE IMPORTANCE OF PELVIC FLOOR MUSCLE EXERCISES DURING PREGNANCY

Manolya PARLAS

Chapter 7

Impact of Pregnancy on The Pelvic Floor and The Importance of Pelvic Floor Muscle Exercises During Pregnancy

MANOLYA PARLAS[1]

Pregnancy leads to changes in the anatomy and physiology of the urogenital system. Blood flow to the pelvic organs increases, and there is a loss of tone in the bladder's smooth muscles. To understand the effects on different parts of the pelvic floor, it is essential to study women from the antepartum period through the postpartum period (Betschart & Wisser, 2017). An increase in lower urinary tract and pelvic floor symptoms is known to occur during pregnancy. Bladder functions are adversely affected, and bladder capacity can increase. Elevated progesterone levels may weaken the detrusor muscle of the bladder and cause relaxation of the urethral sphincter. Due to changes in the urethrovesical angle, the incidence of urinary incontinence (UI) in pregnancy can reach up to 41% as gestational age progresses (Sangsawang & Sangsawang, 2016). UI is most commonly observed during the third trimester of pregnancy, primarily due to the mechanical compression exerted on the bladder by the engaged fetal head in the pelvis. Urinary retention may occur in the first trimester, as there is a change in the position of the vesical neck of the bladder. Urethral mobility becomes irreversible. The mobility of the anterior wall of the bladder increases proportionally with gestational weeks (Wijma et al., 2007). Due to the effects of estrogen hormone secreted by the placenta during pregnancy, pelvic ligaments, the pubic symphysis, and sacroiliac joint structures become relaxed (Betschart &

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Wisser, 2017). The most notable change occurs in the levator ani muscles. In the study by Dietz and Lanzarone (2005), the area of the levator ani muscles was visualized using 3D ultrasound. In women at 36–40 weeks of pregnancy, the area of the levator ani muscles at rest was 11.81 cm², during contraction 9.59 cm², and during the Valsalva maneuver 16.03 cm². The contraction and stretching of the levator hiatus increase with pregnancy (Dietz & Lanzarone, 2005). A negative correlation was found between the levator hiatal area, pelvic floor contraction, and the second stage of labor. Pregnant women with a smaller pelvic hiatal area and stronger pelvic floor contractions tend to experience a longer second stage of labor. However, fetal weight is not correlated with the levator ani volume; fetal position shows a positive correlation with reduced levator ani volume. The lower the fetal head circumference, the thinner the levator ani muscles may be. After adjusting for maternal body mass index, this positive correlation is no longer observed. The relationship between a strong and thick pelvic floor before pregnancy and pelvic floor health remains unclear (Betschart & Wisser, 2017).

During pregnancy, the levator ani muscles stretch up to 250% more than normal to facilitate fetal passage. Pelvic tissue trauma occurs during the passage of the fetal head, and insufficient repair of these tissues postpartum can result in urinary incontinence (UI) and pelvic organ prolapse (POP). The lower incidence of UI in primiparous women who have had cesarean deliveries compared to those who have had vaginal deliveries is attributed to this mechanism. However, studies have shown that cesarean delivery does not provide complete protection against anatomical and functional changes in the pelvic floor (Grob, 2016). The integrity of the pelvic floor structure depends on three factors: pelvic muscles, endopelvic fascia, and pelvic nerves. All of these components may lose their integrity when subjected to labor and/or conditions that increase intra-abdominal pressure.

The incidence of pelvic floor injuries due to obstetric causes and the resulting pelvic floor dysfunction (PFD) is steadily increasing. Healthcare professionals addressing urogynecological problems need to be aware of the impact of pregnancy and childbirth on the pelvic floor (Yalçın, 2009). The endopelvic fascia is more elongated in pregnant women compared to nulligravid women. Additionally, during pregnancy, collagen structures undergo changes, joint relaxation occurs, and the tensile strength of the fascia decreases. Pelvic floor muscle strength is also reduced (Dias et al., 2011). A further significance of strong pelvic floor muscles during pregnancy is the prevention of preterm labor. In pregnant women with weak pelvic floor muscles, advancing gestational age increases pressure on the cervix, which may result in cervical shortening and subsequent preterm labor. Furthermore, pelvic floor muscle weakness can lead to unsuccessful labor induction and prolonged first and second stages of labor (Bø et al., 2013). Today, pelvic floor muscle function during pregnancy is increasingly assessed by physiotherapists using transabdominal ultrasound (Van Delft et al., 2015; Dietz, 2010; Tosun et al., 2016). This non-invasive method allows for the evaluation of pelvic floor muscle strength and morphology. Ultrasonography is used to support muscle training with biofeedback in pelvic floor rehabilitation and to demonstrate the effectiveness of rehabilitation through objective data (Yesilyaprak et al., 2015). The pelvic floor muscles are part of the "core" region that supports the abdominal and pelvic organs. These muscles form the bottom of the core, with the diaphragm as the top, abdominal muscles as the front, and gluteal and paraspinal muscles as the back support (Özengin et al., 2015). Studies examining the relationship between abdominal and pelvic floor muscles have shown co-contraction of various abdominal muscles during pelvic floor muscle contraction. Research on healthy volunteers has also demonstrated the presence of pelvic floor co-contraction during different abdominal muscle contractions (Singh et al., 2017; Tahan et al., 2018; Tayashiki et al., 2016; Vesentini et al., 2019).

De Lancey et al. (2008) explained how biological and lifestyle factors can affect the pelvic floor structure and function according to the integrated life-span model. According to this model, the functional reserve of the pelvic floor reaches its maximum capacity during childhood. With aging, there is a normal decline in the functional reserve. Changes related to pregnancy and vaginal birth trauma can also significantly reduce the functional reserve (De Lancey et al., 2008). A strained pelvic floor due to pregnancy and birth trauma lowers women's continence threshold, leading to urinary incontinence (UI) (Salvatore et al., 2017). However, according to Bo (2004), since pelvic floor muscles are primarily skeletal muscles, they can be "trained" to make the best possible contribution to the continence mechanism (Bo, 2004).

The American College of Obstetricians and Gynecologists (ACOG) considers pelvic floor muscle exercises (PFME) the gold standard for maintaining pelvic floor health and ensuring continence (Level A) (http://www.urojinekoloji.org/gorseller/files/KILAVUZ.pdf). PFME, which is used to prevent and improve urinary incontinence (UI), is an appropriate treatment option that can be preferred during pregnancy (Mørkved et al., 2003). The physiological effects of exercise begin to appear after 2 weeks, complaints decrease within 6-8 weeks, and improvement is seen by the 6th month (Cangöl et al., 2013; Sangsawang & Sangsawang, 2016). Preventing the onset or progression of a disease is fundamental to improving health and reducing the health burden on individuals and society. It is suggested that starting PFME early during pregnancy may reduce UI that may occur during pregnancy and the postpartum period. The goal of PFME is to strengthen the pelvic floor muscle groups that have been weakened and damaged, and as a result, cause involuntary urine leakage at inappropriate times, and to enable them to perform their functions more effectively. It is known that PFME significantly increases muscle strength and tone in pregnant women. Additionally, it improves muscle coordination and contributes to an increase in flexibility, which facilitates the labor process. PFME is particularly recommended for pregnant women with low pelvic floor muscle strength. A reliable method, PFME is also frequently recommended for preventing and treating the risk of preterm birth in pregnant women (Ferreira et al., 2015; Wesnes & Lose, 2013). Although the short-term preventive and therapeutic effects of PFME are supported by many studies, its long-term therapeutic effect remains controversial and should be clarified with further research. According to a case study, muscle adaptation and the benefits gained are reversible. Therefore, PFME is a lifelong process and should be part of the daily routine for pelvic floor health (Agur et al., 2008).

The PFME protocol for pregnant women has been applied in various forms in the literature, incorporating different muscle contraction durations and repetitions. This diversity necessitates the selection of an exercise protocol depending on the characteristics of the studied pregnancy population. The recommended application period is generally 8 or 12 weeks, with exercises repeated 2-3 times a week. However, the exact number of repetitions, rest, and contraction durations are not always specified. The exercises can be performed as a home program or under the guidance of a physiotherapist. It is recommended that an effective PFME program be implemented for at least 8 weeks and under the supervision of a physiotherapist (Morkved & Bo, 2014).

The benefits of PFME during the antenatal period include increasing pelvic floor muscle strength, reducing the need for episiotomy, lowering the risk of pelvic organ prolapse (POP), preventing hemorrhoid formation, ensuring urinary control, and enhancing orgasm. Especially after vaginal birth, these exercises are also applied to reduce the rate of lacerations, restore the tone of perineal muscles, reduce perineal edema, accelerate circulation, and prevent stress urinary incontinence (SUI) (Brown et al., 2010; DeLancey et al., 2003). Women who perform PFME have a lower incidence of postpartum urinary incontinence (Palmezoni et al., 2017).

In a systematic review examining the effect of pelvic floor muscle training on the prevention and treatment of UI during pregnancy, studies with high adherence to exercise protocols and close follow-up indicated that PFME during pregnancy and after childbirth can prevent and treat UI (Mørkved & Bø, 2014). Additionally, in a study summarizing the evidence for PFME (including both physical and behavioral components) as an intervention to prevent or treat UI in women, clinically significant reductions in the risk of developing UI during pregnancy and postpartum were found. The study also identified additional benefits of PFME in preventing prolapse and enhancing sexual function. If UI develops during pregnancy or postpartum, PFME is an appropriate treatment option as a first-line intervention. For beginners, an exercise program with 8 contractions lasting 8 seconds, three times a day for at least three months, can be considered a "general" prescription. All women should receive clear, accurate verbal instructions on how to perform PFME. Women who are incontinent or unable to perform PFME correctly should be referred for pelvic floor rehabilitation. Behavioral support from health professionals, which increases women's opportunities, abilities, and motivation for pelvic floor muscle training, is as important as the exercise prescription itself (Woodley & Hay-Smith, 2021).

References

Agur, W.I., Steggles, P., Waterfield, M., Freeman, R.M. (2008). The long-term effectiveness of antenatal pelvic floor muscle training: eight-year follow up of a randomised controlled trial. BJOG:an international journal of obstetrics and gynaecology, 115(8):985-90.

Betschart, C., Wisser, J. (2017). The Effect of Pregnancy on the Pelvic Floor. In: Doumouchtsis, S. (eds) Childbirth Trauma. Springer, London. 2017. 43-56.

Bo, K., Hilde, G., Jensen, J.S., Siafarikas, F., Engh, M.E. (2013). Too tight to give birth? Assessment of pelvic floor muscle function in 277 nulliparous pregnant women. International Urogynecology Journal. 24:2065–70.

Bø, K. (2004). Pelvic floor muscle training is effective in treatment of female stress urinary incontinence, but how does it work? Int Urogynecol J. 15:76–84.

Brown, S.J., Donath, S., MacArthur, C., McDonald, E.A., Krastev, A.H. (2010). Urinary incontinence in nulliparous women before and during pregnancy: prevalence, incidence, and associated risk factors. Int Urogynecol J. 21(2):193–202.

Cangöl, E., Aslan, E., Yalçın, Ö. (2013). Pelvic Floor Muscle Exercises for Women andthe Nurse’s Role. HEAD. 10(3):49-56.

DeLancey, J., Kearney, R., Chou, Q., Speights, S., Binno, S. (2003). The appearance of levator ani muscle abnormalities in magnetic resonance images after vaginal delivery. Obstet Gynecol. 101(1):46-53.

DeLancey, J.O.L, Low, L.K., Miller, J.M., Patel, D.A, Tumbarello, J.A. (2008). Graphic integration of causal factors of pelvic floor disorders: an integrated life span model. Am J Obstet Gynecol. 199:610.e611–5.

Dias, A., Assis, L., Barbosa, A., Santini, A.C., Picelli-Dias, F. (2011). Effectiveness of perineal exercises in controlling urinary incontinence and improving pelvic floor muscle function during pregnancy. Neurourology and Urodynamics. 30(6):968.

Dietz, H.P., Lanzarone, V. (2005). Levator trauma after vaginal delivery. Obstetrics & Gynecology.106(4):707-12.

Dietz, H.P. (2010). Pelvic floor ultrasound: a review. Am J Obstet Gynecol. 202(4):321-34.

Ferreira, C.H., Dwyer, P.L., Davidson, M., De Souza, A., Ugarte, J.A., Frawley, H. (2015). The effect of pelvic floor muscle training on female sexual function: a systematic review. Physiotherapy. 101:380-81.

Grob, A.T. (2016). Structural and functional ultrasound imaging of the pelvic floor during pregnancy and postpartum, ISBN: 978-90-365-4248-7.

Mørkved, S., Bø, K., Schei, B., Salvesen, K.A. (2003). Pelvic floor muscle training during pregnancy to prevent urinary incontinence: a single-blind randomized controlled trial. Obstet Gynecol. 101(2):313-9.

Morkved, S., Bo, K. (2014). Effect of pelvic floor muscle training during pregnancy and after childbirth on prevention and treatment of urinary incontinence: a systematic review. British journal of sports medicine. 48(4):299-310.

Özengin, N., Yıldırım, N.Ü., Duran, B. (2015). A comparison between stabilization exercises and pelvic floor muscle training in women with pelvic organ prolapse. Turk J Obstet Gynecol. 12(1):11

Palmezoni, V.P., Santos, M.D., Pereira, J.M., Bernardes, B.T., Pereira-Baldon, V.S., Resende,

A.P. (2017). Pelvic floor muscle strength in primigravidae and non-pregnant nulliparous women: a comparative study. International urogynecology journal. 28(1):131-7

Salvatore, S., DeLancey, J., Igawa, Y., Koelbl, H., Laterza, R.M., Serati, M et al.. (2017). Pathophysiology of urinary incontinence, faecal incontinence and pelvic organ prolapse. In: Abrams P, Cardozo L, Wagg A, Wein A (eds) Incontinence: 6th International Consultation on Incontinence, Tokyo. 6th edn. International Continence Society (ICS) and International Consultation on Urological Diseases (ICUD), Bristol United Kingdom; 361–496.

Sangsawang, B., Sangsawang, N. (2016). Is a 6-week supervised pelvic floor muscle exercise program effective in preventing stress urinary incontinence in late pregnancy in primigravid women?: A randomized controlled trial. Eur J Obstet Gynecol Reprod Biol. 197:103-110.

Singh, N., Arya, K.N., Pervin, A. (2017). Synergistic Action of Deep Abdominals and Pelvic Floor Muscles: Implication for Incontinence Management in Women. Indian J Physiother Occup Ther. 11(3):66-9.

Tahan, N., Brojerdi, M.H. (2018). Effect of pelvic floor muscle contraction on ultrasonographic thickness of abdominal muscles. J Clin Physio Res. 3(4):144-8.

Tayashiki, K., Takai, Y., Maeo, S., Kanehisa, H. (2016). Intra-abdominal pressure and trunk muscular activities during abdominal bracing and hollowing. Int J Sports Med. 37(02):134-43.

Tosun, Ö.Ç., Solmaz, U., Ekin, A., Tosun, G., Gezer, C., Ergenoglu, A.M. et al. (2016). Assessment of the effect of pelvic floor exercises on pelvic floor muscle strength using ultrasonography in patients with urinary incontinence: a prospective randomized controlled trial. J Phys Ther Sci. 28(2):360-5.

Van Delft, K.W., Sultan, A.H., Thakar, R., Shobeiri, S.A., Kluivers, K.B. (2015). Agreement between palpation and transperineal and endovaginal ultrasound in the diagnosis of levator ani avulsion. Int Urogynecol J. 26(1):33-9.

Vesentini, G., El Dib, R., Righesso, L.A.R., Piculo, F., Marini, G., Ferraz, G.A.R. et al.(2019). Pelvic floor and abdominal muscle cocontraction in women with and without pelvic floor dysfunction: a systematic review and meta-analysis. Clinics. 74:e1319.

Wesnes, S.L., Lose, G. (2013). Preventing urinary incontinence during pregnancy and postpartum: a review. International urogynecology journal. 24(6):889-99.

Wijma, J., Weis Potters, A.E., Von der Mark, T.W., Tinga, D.J., Aarnoudse, J.G. (2007). Displacement and recovery of the vesical neck position during pregnancy and after childbirth. Neurourol Urodyn. 26:372–6.

Woodley, S.J., Hay-Smith, E.J.C. (2021). Narrative review of pelvic floor muscle training for childbearing women—why, when, what, and how. International Urogynecology Journal. 32(7):1977-88.

Yalçın, Ö. (2009). Pelvis Tabanı Anatomisi. Yalçın Ö (Editör) Temel Ürojinekoloji İstanbul: Nobel Tıp Kitabevleri. pp: 7-19.

Yeşilyaprak, S.S., Tosun, Ö.Ç., Angın, S. (2015). Kas Ultrasonu ve Fizyoterapi. Turk Klin Physiotherapy and Rehabilitation-Special Topics. 1(1):43-53.

USE OF TECHNOLOGY IN PROTECTING AND IMPROVING WOMEN'S HEALTH

Manolya PARLAS

Chapter 8

Use of Technology In Protecting And Improving Women's Health

MANOLYA PARLAS[1]

Introduction

The rapid advancements in technology today are impacting all aspects of life. The integration of computers and smartphones into daily routines has facilitated access to healthcare, education, and service sectors. Technological advancements in healthcare within our country include online appointment systems, the e-Nabız application, mobile applications, and tele-rehabilitation services. Recent advancements in technology have brought about significant innovations in healthcare, leading to improvements in the delivery and quality of diagnostic and treatment services. Within the scope of digital transformation, communication between medical devices and artificial intelligence-supported applications offers recommendations to healthcare professionals in diagnostic and testing processes, thus supporting innovative healthcare approaches (Joseph et al., 2019; Limon, 2019).

The use of technology in women's health encompasses the antenatal period, pregnancy, birth, postpartum period, and neonatal care, as well as health and disease concepts that span various life stages of women (Doğan Merih, 2018). With technological advancements in the field of women's health, various technological devices have started to be widely used in healthcare services. These products include mobile applications for menstruation tracking, electronic pregnancy tests, advanced ultrasound devices, wearable technologies that monitor fetal heart rate and movements during pregnancy, protective garments

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developed to shield the fetus from the potential harms of technological devices, and birthing beds designed to support and increase comfort during labor (Doğan Merih, 2021; Katal and Yazıcı, 2017). Technology-supported applications in women's health also include artificial intelligence, robotic surgery, laparoscopic surgery, and telehealth services (Karagöl et al., 2023). When examined in terms of women's health, these technologies provide support across various stages of a woman's life (e.g., childhood, adolescence, adulthood, and reproductive stages), helping to promote and protect health (Kopmaz and Arslanoğlu, 2018; Yılmaz et al., 2024). Women may face various health issues in areas such as infertility, urogynecology, gynecology, gynecological oncology, sexual health, perinatology, and menopause. Advances in technology facilitate the diagnosis and treatment processes of these issues, thereby reducing morbidity rates and even preventing certain conditions (Arslan et al., 2015; Çolak and Öztürk, 2021). Additionally, with the widespread use of technology, internet-based digital media provides pregnant women and other women with easy access to health information resources. Digital media offers a secure platform for emotional support, connecting with other pregnant individuals, gaining information, and sharing experiences, making it an effective support tool (Huberty et al., 2013).

In the literature, the use of technology in nursing practices has been shown to support patients' daily living activities, educate patients, and provide access to healthcare services (Korhonen et al., 2015). Developments in technology, especially in nursing, have strengthened the areas of care and treatment, significantly contributing to improvements in service quality. For the provision of quality care, it is essential to develop new technologies and empower nurses to use existing technologies effectively (Ferreira et al., 2020). A review examining the effectiveness of digital technology and nursing care found that most efficacy studies were conducted on information technologies, robots, and sensors; however, efficiency studies were relatively rare. The need for high-quality evidence in current studies has been emphasized (Krick et al., 2019). This section aims to compile and present current literature information on the use of technology and the nursing approach in protecting and promoting women’s health.

Technology Use and Nursing Approaches in Women's Health

Many technological products have begun to be used in diagnosing, preventing, treating and maintaining gynecological and obstetric health problems (Karagöl et al, 2023). These products include mobile applications for menstruation tracking, pregnancy follow-up programs, underwear that provides early diagnosis of breast cancer, digital systems in gynecological cancer screening and wearable technologies for alleviating menopausal complaints (Kartal and Yazıcı, 2017; Karagöl et al, 2023). In the literature, it is seen that the use of technology in the field of women's reproductive health has become widespread in artificial intelligence, robotic surgery, laparoscopy and telehealth services (Karagöl et al, 2023; Cirban and Daşıkan, 2019).

The pregnancy period is one of the areas where artificial intelligence technologies are used the most. Many physiological changes occur in the female body during pregnancy, and these changes necessitate certain adaptation processes in the postpartum period (Lagadec et al., 2018). Artificial intelligence in the perinatal period has been used in areas such as pregnancy screening, remote monitoring, pharmacology, fetal development and electronic monitoring, and has provided positive results. Artificial intelligence provides benefits in various areas such as informing patients in a virtual environment, developing health software, determining the risk of premature birth, and conscious use of medication during pregnancy (Cirban Ekrem and Daşıkan, 2021). When examples of artificial intelligence applications in the perinatal period are examined, pregnancy outcome monitoring with artificial intelligence networks, gestational age estimation, chromosomal anomaly detection with artificial neural networks, remote monitoring of gestational diabetes mellitus (GDM), home fetal heart rate monitoring, automatic three-dimensional ultrasonography (USG) imaging, telehealth services in pregnancy follow-up during the COVID-19 period, and predicting the possibility of developing depression in the postpartum period (Esinler and Yaralı, 2006; Ramakrishnan et al., 2021; Warrick et al., 2010; Caballero-Ruiz et al., 2017; Delanerolle et al., 2021; Pluym et al., 2021; Cirban et al., 2021; Wang et al., 2019). In the perinatal period, artificial intelligence technologies focus on pregnancy follow-up, early diagnosis and treatment for maternal and fetal health, ensuring consistency in pregnancy follow-ups, and reducing maternal-fetal morbidity and mortality rates. Considering that nurses are in constant interaction with patients, the integration of artificial intelligence into nursing care is important. Since the care and treatment services provided require a multidisciplinary approach, nurses and other health professionals need to adopt technology and strengthen interdisciplinary communication. Although ethical issues such as patient privacy, technology-related errors, role confusion, and lack of human contact are on the agenda in artificial intelligence-supported health technologies, more transparent, holistic, and ethically appropriate artificial intelligence systems need to be developed to solve these problems. It is also important for health professionals to increase their knowledge and skills regarding these technologies (Güvercin, 2020). In recent years, the use of laparoscopic surgery in the field of gynecology has increased (Farag et al., 2018). Laparoscopic gynecological surgery plays an important role in the diagnosis of gynecological diseases, especially infertility and chronic pelvic pain, by reducing complications and unnecessary procedures (Argentino et al., 2019). While laparoscopic hysterectomy offers advantages such as reduced hospital stay and blood loss and rapid recovery, it also carries some complication risks such as long surgical time and urinary system damage (Eren et al., 2020). There is also a study reporting that laparoscopic myomectomy protects patient safety, shortens hospital stay, results in early mobilization and less postoperative pain (Tanos et al., 2019). Another study emphasized that laparoscopic hysterectomies are also a safe method in benign gynecological diseases (Ekmez et al., 2017). Laparoscopic surgery has also led to an emphasis on early nutrition, early mobilization, rehabilitation and patient education in nursing care (Çelik, 2011).

Rapid developments in the use of laparoscopy have allowed the emergence of revolutionary robotic surgeries. Robotic surgeries are widely used in women's health in hysterectomy, myomectomy, sacrocolpopexy, uregynecology, endometriosis and gynecological oncology (Lauterbach et al., 2017). Just like laparoscopic surgeries, robotic surgeries, which reduce the length of hospital stay and the risk of infection, have some disadvantages such as cost and preliminary preparation (Ateş et al., 2017). The advantages of robotic surgery in terms of nursing care include; limited incision area, minimizing the amount of blood loss, reducing the risk of infection, increasing comfort and reducing the pain felt after surgery, shortening the recovery process and hospital stay (Kılınç Akman et al., 2022). Another health technology that has become widespread with the Covid-19 process is telehealth services. These services have advantages in terms of not requiring contact, being easily accessible and providing service to many people simultaneously. For women, it has benefits such as not requiring a visit to a health institution, saving time, and being economical. The trend towards telehealth has increased in ensuring continuity of obstetric care, such as antenatal visits during pregnancy, in order to prevent infections that may develop due to the pandemic (Fryer et al., 2020). Examples of telehealth in women's health include mobile applications for bladder diary monitoring, postpartum blood pressure monitoring with Wi-Fi connected devices, and fertility monitoring with patient-generated data (Karagöl et al., 2023). In a systematic review of telehealth interventions to improve obstetric and gynecological health outcomes, it was stated that telehealth applications had positive effects on smoking cessation, breastfeeding, and maternal and fetal health (DeNicola et al., 2020). In another study, it was found that telehealth provided improvements in the treatment of pelvic floor dysfunction, urinary system symptoms, and quality of life (Mata et al., 2021). With telehealth applications, even the most distant individuals can be reached in nursing care and patients can be evaluated, training can be provided on the subjects they need with consultancy services and possible problems can be identified in advance (Pazar et al., 2015). When wearable technology products aimed at improving women's health are examined today; innovative approaches to birth control that are attached to the ear area in the form of earrings and secrete a fixed amount of hormones, a device that is worn around the waist of the pregnant woman as a belt in high-risk pregnancy monitoring and measures fetal movement and fetal heart rate through sensors, technological products that are used as covers on the abdomen of expectant mothers and aim to protect the baby from radiation, and innovative examples that aim to make breast milk more comfortable by placing them inside mothers' underwear (Doğan Merih, 2023).

Pregnancy and the postnatal period are important periods in a woman's life and significantly affect her physiologically and psychosocially. Pregnant women need constant information to ensure their health, have a healthy birth and adapt to parenthood (Javanmardi et al., 2018). Therefore, pregnant women increasingly turn to easily accessible digital media to meet their information needs. In a study conducted in Australia on digital media use during pregnancy and early motherhood, it was stated that 73% of the participants used digital media during pregnancy and the reasons for using these applications were mostly to obtain information about fetal development (86%) and to monitor changes in their bodies (71%) (Lupton, 2016). In another study conducted in Sweden, it was found that 95% of women frequently used the Internet to access pregnancy-related information; compared to multigravidas, primigravidas conducted more research on nutrition, fetal health and physical exercise during pregnancy (Bjelke et al., 2016). In a study conducted in Turkey to examine women's pregnancy-related internet use; It has been found that women aged 25-34 use the Internet more frequently than women aged 18-24 and over 35, women with a higher education level than those with a lower education level, working women than those who are not working, and primiparous women than multiparous women (Kavlak et al., 2012). When digital media use is examined in the postpartum period; it has been found that the areas in which women search for information on digital media include newborn care and nutrition, postpartum complications, depression, stress, self-care and hygiene, nutrition, sexual life and contraceptive methods (Tomfohrde and Reinke 2016). Studies have shown that most women use digital media in the postpartum period to search for information, continue breastfeeding, facilitate self-care and improve health literacy (Alianmoghaddam et al., 2019; Grimes et al., 2014; Kocademir and Gerçek, 2020).

Conclusion and Recommendations

Today, developing technology has taken its place in many areas within the health system. Among these areas, the field of women's health is effective in the diagnosis, treatment and care of many problems by taking advantage of technological developments. Nurses who provide technology-supported care in nursing care practices need to follow current technological developments in the field of women's health throughout their working lives and renew their knowledge and skills accordingly. With the increasing use of technology in the field of health, increasing technology literacy is also gaining importance in order to protect women's health. In this context, the media should create awareness about the correct use of technology, the importance of accessing reliable health information and requesting information from health professionals. Women should be provided with information about the safe use of mobile applications and it should be emphasized that the correct use of technology will bring positive behavioral changes. In addition, it is recommended to create safe and sustainable solutions by obtaining expert opinions of health professionals in applications to be developed in areas such as exercise, nutrition and stress management.

References

Alianmoghaddam, N., Phibbs, S., Benn, C. (2019). " I did a lot of Googling ": A qualitative study of exclusive breastfeeding support through social media.Women and Birth, 32(2), 147-156.

Argentino, G., Dias, F., Leite, N., Peres, G., Elias, L., Bortolani, V., Dias, R. (2019). The role of laparoscopy in the propaedeutics of gynecological diagnosis. Acta Cir Bras, 34,1; 2-11.

Arslan, H., Özbek, Ş., & Bursa, A. (2015). Küreselleşen Sağlık ve Kadın Sağlığı Hemşireliği. KASHED, 2,2; 46-57.

Ateş, U., Ergün, E., Göllü, G., Türedi, B., Bahadır, K., & Çakmak, A. (2017). Robotik Cerrahinin Ülkemizdeki Yaygınlaşma Süreci ve Önündeki Engeller. Türkiye Çocuk Hastalıkları Dergisi, 4; 248-253.

Bjelke, M., Martinsson, A., Lendahls, L., Oscarsson, M. (2016). Using the Internet as a source of information during pregnancy: A descriptive cross-sectional study in Sweden. Midwifery, 40, 187-191.

Caballero-Ruiz, E., Garcia-Saez, G., Rigla, M., Villaplana, M., Pons, B., Hernando, M.E. (2017). A web-based clinical decision support system for gestational diabetes: Automatic diet prescription and detection of insulin needs. International Journal of Medical Informatics, 102, 35-49.

Cirban Ekrem, E., Daşıkan, Z. (2021). Perinatal Dönemde Yapay Zekâ Teknolojisinin Kullanımı. Eurasian Journal of Health Technology Assessment, 5,2; 147-162.

Çelik, S. (2011). Cerrahi Bakımda Bilgi Güncelleme. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi, 2, 2; 61-65.

Çolak, M., & Öztürk, H. (2021). Ebelikte Yeterlilik, Yetkinlik ve Teknoloji Kullanımı. Türkiye Klinikleri Sağlık Bilimleri Dergisi, 6,2; 340-349.

Delanerolle, G., Yang, X., Shetty, S., Raymont, V., Shetty, A., Phiri, P., *et al.* (2021). Artificial intelligence: a rapid case for advancement in the personalization of gynaecology/obstetric and mental health care. Women's Health. 17, 1-20.

DeNicola, N., Grossman, D., Marko, K., Sonalkar, S., Tobah, Y., Ganju, N., Lowery, C. (2020). Telehealth Interventions to Improve Obstetric and Gynecologic Health Outcomes. Obstetrıcs and Gynecology, 135,2; 371-382.

Doğan Merih, Y. (2018). İnovatif hemşirelerin yol haritası. İstanbul: Nobel Tıp Kitabevleri.

Doğan Merih, Y. (2021). Kadın sağlığı ve hastalıkları, Ankara: Nobel Tıp Kitabevleri.

Ekmez, M., Dane, C., Akgüneş, A., Ekmez, F., Göksedef, P., Aydın, D., Yücel , E. (2017). Kliniğimizde Laparoskopik Histerektomilerin Değerlendirilmesi. Med Bull Haseki, 55; 311-3114.

Eren, C., Gürsoy, Ö., Gürer, H., & Bayırlı, R. (2020). Evre 3-4 Adenezyonu Olan Olgularda Laparoskopik Histerektomi Operasyonlarının Klinik Değerlendirmesi: Eskişehir. Kocatepe Tıp Dergisi, 360-365.

Esinler, İ., Yaralı, H. (2006). Artifisiyel neural network (Yapay Zekâ) ile ICSI uygulamalarında gebeliklerin tahmin edilmesi. Uzmanlık Sonrası Eğitim ve Güncel Gelişmeler Dergisi, 3, 176-180.

Farag, S., Padilla, P., Smith , K., & Sprague, M. (2018). Management, Prevention, and Sequelae of Adhesions in Women Undergoing Laparoscopic Gynecologic Surgery: A Systematic Review. J Minim Invasive Gynecol, 25,7; 1194-1216.

Ferreira, A. G., Carvalho, D. P. de, Barlem, E. L. D., Lourenção, L. G., Oliveira, A. M. N. de, & Rocha, L. P. (2020). Influence of philosophy in the use of nursing technology: integration review. Research, Society and Development, 9(4), e156943026.

Fryer, K., Delgado, A., Tara Foti, Reid, C., & Jennifer Marshall. (2020). Implementation of Obstetric Telehealth During COVID 19 and Beyond. Maternal and Child Health Journal, 24, 1104-1110.

Grimes, H.A., Forster, D.A., Newton, M.S. (2014). Sources of information used by women during pregnancy to meet their information needs. Midwifery, 30(1), 26-33.

Güvercin, C.H. (2020). Tıpta yapay zeka ve etik. (Ed: Ekmekci, P.E.). Yapay zeka ve tıp etiği. 1. Baskı. Ankara: Türkiye Klinikleri, 7-13.

Huberty, J., Dinkel, D., Beets, M., Coleman, J. (2013). Describing the use of the internet for health, physical activity and nutrition information in pregnant women. Maternal and Child Health Journal, 17(8), 1363-1372.

Javanmardi, M., Noroozi,M., Mostafavi, F., Ashrafi-rizi, H. (2018). Internet usage among pregnant women for seeking health information: A review article. Iran J Nurs Midwifery Res, 23(2), 79-86.

Joseph, M.L., Huber, D.L., Bair, H., Moorhead, S. & Hanrahan, K. (2019). A Typology of innovations in nursing. J Nurs Adm, 49(7-8):389-95.

Karagöl B, Bilmez G, Arıöz A, Şahin S. (2023). Kadın sağlığı alanında teknoloji kullanımı ve bakım. Türkiye Sağlık Araştırmaları Dergisi, 4(3):57-69.

Kartal, Y.A. & Yazıcı, S. (2017). Health technologies and reflections in nursing practices. International Journal. 10(3): 1733.

Kavlak, O., Atan, Ş.Ü., Güleç, D., Öztürk, R., Atay, N. (2012). Pregnant women's use of the internet in relation to their pregnancy in Izmir, Turkey.Inform Health Soc Care, 37(4), 253-63.

Kılınç Akman, E., Balcı, F., & Kanan, N. (2022). Robot Yardımlı Cerrahi Girişimlerde İkinci Güvenli Cerrahi Kontrol Listesi Kullanımının Önemi (The Second "Time-Out"). Fenerbahçe Üniversitesi Sağlık Bilimleri Dergisi. 2,2; 539–547.

Kocademir, L., & Gerçek, E. (2020). Prenatal ve Postnatal Dönemde Dijital Medyanin Kullanimi. Kadın Sağlığı Hemşireliği Dergisi, 6(1), 29-43.

Kopmaz B, Arslanoğlu A. Mobil sağlık ve akıllı sağlık uygulamaları. Sağlık Akademisyenleri Dergisi. 2018;5(4):251-255.

Korhonen, E.-S., Nordman, T., & Eriksson, K. (2015). Technology and its ethics in nursing and caring journals: An integrative literature review. Nursing Ethics, 22 (5), 561-576.

Krick, T., Huter, K., Domhoff, D. et al. (2019). Digital technology and nursing care: a scoping review on acceptance, effectiveness and efficiency studies of informal and formal care technologies. BMC Health Serv Res 19, 400.

Lagadec, N., Steinecker, M., Kapasi, A., Magnier, A.M., Chastang, J., Robert, S., Gauaou, N. & Ibanez, G. (2018). Factors influencing the quality of life of pregnant women: a systematic review. BMC Pregnancy and Childbirth, 18;455-469.

Lauterbach, R., Matanes, E., & Lowenstein, L. (2017). Review of Robotic Surgery in Gynecology-The Future Is Here. Rambam Maimonides Med J, 8,2.

Limon S. (2019). Hastanelerdeki tıbbi dokümanların geleneksel ortamdan elektronik ortama dönüşümü. Uygulamalı Sosyal Bilimler ve Güzel Sanatlar Dergisi,1(1):30-39.

Lupton, D. (2016). The use and value of digital media for information about pregnancy and early motherhood: A focus group study. BMC Pregnancy and Childbirth, 16, 171.

Mata, K., Costa, R., Carbone, É., Gimenez, M., Bortolini, M., Castro, R., & Fitz, F. (2021).

Telehealth in the Rehabilitation of Female Pelvic Floor Dysfunction: a Systematic Literature Review. International Urogynecology Journal, 32;249-259.

Merih, Y. D. (2023). Prekonsepsiyonel Dönemden Postpartum Döneme İnovatif Gelişmeler. Türkiye Sağlık Enstitüleri Başkanlığı Dergisi, 6(2), 108-116.

Pazar, B., Taştan , S., & İyigün, (2015). E. Tele Sağlık Sisteminde Hemşirenin Rolü. Bakırköy Tıp Dergisi, 11,1; 1-4.

Pluym, I.D., Afshar, Y., Holliman, K., Kwan, L., Bolagani, A., Mok, T., Silver, B., Ramirez, E., Han, C.S. & Platt, L.D. (2021). Accuracy of automated three-dimensional ultrasound imaging technique for fetal head biometry. Ultrasound Obstet Gynecol. 57(5):798-803.

Ramakrishnan, R., Rao, S. & He, J.R. (2021). Perinatal health predictors using artificial intelligence: A review. Women's Health, 17.

Tanos, V., Berry, K., Frist, M., Campo, R., & DeWilde, R. (2019). Prevention and Management Of Complications in Laparoscopic Myomectomy. Hindawi, 1-9.

Tomfohrde, O.J.,& Reinke, J.S. (2016). Breastfeeding mothers use of technology while breastfeeding. Computers in Human Behavior, 64, 556-561.

Wang, S., Pathak, J., & Zhang, Y. (2019). Using electronic health records and machine learning to predict postpartum depression. Studies in health technology and informatics, 264, 888–892.

Warrick, P.A., Hamilton, E.F., Precup, D., Kearney, R.E. (2010). Classification of normal and hypoxic fetuses from systems modeling of intrapartum cardiotocography. IEEE Transactions on Bio-medical Engineering. 57(4), 771-779.

Yılmaz M, Kılınç N, Köksal Ç. (2024). Teknolojinin Kadın Sağlığı Üzerindeki Etkileri. J TOGU Heal Sci, 4(1:Özel Sayı): 55-64.

SAFETY KNOWS NO PAUSE: IDENTIFYING THE RELATIONSHIP BETWEEN DISASTER LITERACY AND PUBLIC HEALTH NURSES' DISASTER RESPONSE PERFORMANCE

ROSELYN M. MADANLO, YARA M. PALWA, RENE G. VIBAS JR, RENMIR JAN D. MAALA

Chapter 9

Safety Knows No Pause: Identifying the Relationship Between Disaster Literacy and Public Health Nurses' Disaster Response Performance

ROSELYN M. MADANLO[1], YARA M. PALWA[2], RENE G. VIBAS JR[3], RENMIR JAN D. MAALA[4]

I. INTRODUCTION

Public health nurses play significant roles and duties during all stages of catastrophes by using their scientific expertise and understanding of behavioral concerns, physiology, pharmaceuticals, cultural-family systems, and epidemiological studies. Everyone must be prepared, morally and ethically, for the greater good of the community, whether it be the strikes of the terrorists or natural disasters. This presupposes that everyone will risk their general well-being and not depend on professionals involved because others need more confidence, knowledge, and training. Public health nurses will always be crucial in every disaster as they are on the front line of providing emergency response[1].

The increasing media coverage of the devastating effects of disasters in Canada has increased the need to prepare healthcare facilities and communities for emergencies and disasters to reduce widespread morbidity and mortality. Although the causes and characteristics of these two incidents were very different, they showed that a coordinated response by healthcare facilities, safety precautions, and their absence significantly impacted the outcome. Furthermore, there were specific issues in the Philippines, particularly in the Municipality of Columbia; some problems encountered were inadequate training materials and resources and a need for more training among the personnel in charge of catastrophe risk reduction. Despite these obstacles, staff members and medical professionals, especially public health nurses, agreed that any organization complied with the law. It was determined that the practice of disaster preparedness classes and training, as well as funding for the publishing and distributing of the program's training materials for institutions[3].

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A string of destructive earthquakes struck Southern Mindanao in the Philippines in October 2019. The first earthquake, measuring 6.3 on October 16, was followed by two more, measuring 6.6 and 6.5 on October 29 and 31, respectively. There were aftershocks with magnitudes greater than 5.0 between those three dates. The 6.3 magnitude earthquake that struck on October 16 affected 3,068 people in regions 11 and 12, leaving five people dead and 89 injured. The National Disaster Risk Reduction and Management Council (NDRRMC) reported that 326,816 individuals were affected by earthquakes on October 29 and 31, which had magnitudes of 6.6 and 6.5, respectively. Three persons were listed as missing in line with reports from the Philippine Institute of Volcanology and Seismology. In Davao City, 27 more people were injured in addition to the three extra fatalities [4]. The Advanced National Seismic System recorded a 6.9-magnitude earthquake on December 15 of the same year, along with a string of powerful aftershocks, nine of which had magnitudes equal to or greater than 5.0. This earthquake affected 242,840 people in Davao del Sur, caused 210 injuries, and claimed 12 lives[5]. Experience has shown that closer health surveillance and service provision are required during the recovery and rehabilitation phase following a disaster, mainly when infrastructure losses and disruptions in the provision of essential services are significant due to the damage caused by the disaster event[6].

According to a study, to enhance and improve the nurses' disaster preparedness, more training should be conducted academically and institutionally[7]. As a result, medical personnel must be trained and ready to respond to emergencies and disasters[8]. Public and private education campaigns, reaction team training, and drills simulating emergency response situations are required to assist in emergency and disaster preparedness. Public awareness and education campaigns seek to foster a community that is well-informed, vigilant, and self-sufficient, capable of contributing fully to and cooperating with other citizens as well as elected leaders; with that, here in Davao City, public health nurses play a vital role throughout the disaster continuum and not just during the initial response phase, to address the health issues brought on by the catastrophe occurrence.

None of the above studies dealt with Exploring the Relationship Between Disaster Literacy and Public Health Nurse's Disaster Response Performance. Therefore, the present research generated new knowledge. The stated scenario persuaded the researcher to explore the relationship between disaster literacy and public health nurses' disaster response performance. It is in this context that the researchers are interested in exploring whether disaster literacy significantly affects the performance of public health nurses' response to the disaster, as this can raise awareness among the intended beneficiaries of this study and possibly develop an action plan to improve institution's knowledge and management of the disaster and thus, the need to conduct this study.

This research aimed to determine the relationship between Disaster Literacy and public health nurses' disaster response performance. Specifically, it sought to answer the following questions:

1. What is the demographic profile of the respondents in terms of:
    1.1 Sex;
    1.2 Work Experience
2. What is the Level of Disaster Literacy of Public Health Nurses in Davao City?
3. What is the Level of Disaster Response Performance of Public Health Nurses' in Davao City?

4. Is there a significant difference between the level of disaster literacy and the level of disaster response performance of public health nurses in Davao City when grouped according to their demographic profile?
5. Is there a significant relationship between the level of disaster literacy and the level of disaster response performance of Public Health Nurses in Davao City?
6. What is the disaster preparedness plan based on the result of this study?

The study was on Identifying the Relationship Between Disaster Literacy and Public Health Nurse's Disaster Response Performance in Davao City Health Office- Main, one of the agencies under the Local Government Unit located at 124 Pichon St. Poblacion District, Davao City, Davao del Sur Philippines. The data was collected through survey questionnaires, and participants were explicitly selected public health nurse workers in 124 Pichon St. Poblacion City Health Office. The researchers chose this place as it will provide the information we needed for this study. The study will be conducted only in the Davao City Health Office, Main, where health professionals, specifically public health nurses, provide public health and clinical services in the rural setting. Other Health Offices are excluded.

Conceptual Framework

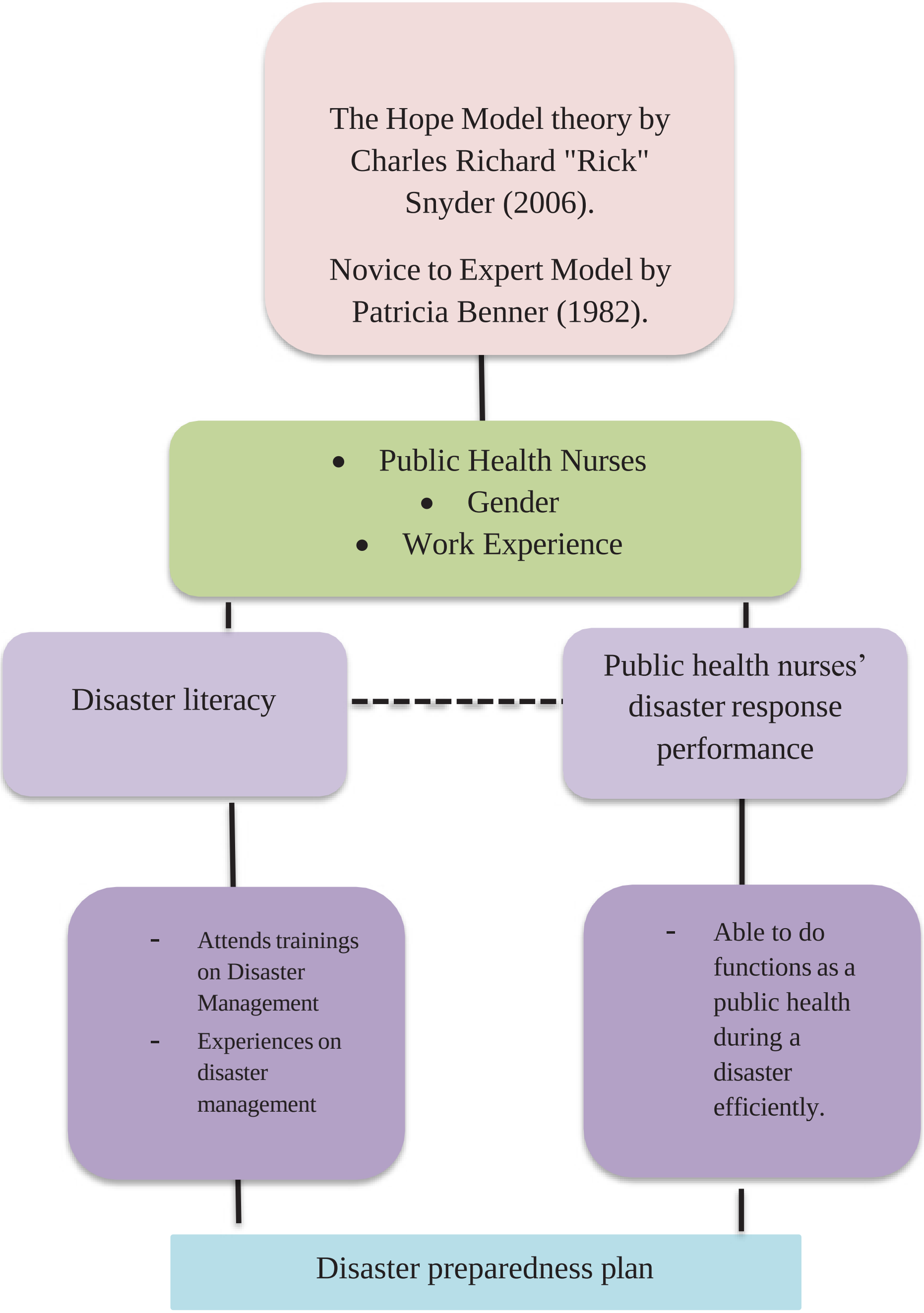
The Hope Model theory by Charles Richard "Rick" Snyder (2006).
Novice to Expert Model by Patricia Benner (1982).
• Public Health Nurses
• Gender
• Work Experience
Disaster literacy
Public health nurses' disaster response performance
- Attends trainings on Disaster Management
- Experiences on disaster management
- Able to do functions as a public health during a disaster efficiently.
Disaster preparedness plan

Figure 1. *Research Paradigm*

This study is anchored on Charles Richard "Rick" Snyder's Hope model theory in 2006, which explains the fundamental component of disaster nursing during the emergency response stage of a sudden-onset disaster. "HOPE" stands for Professional adaptation, Endurance, recovery, Organization and administration of urgent reaction, and Holistic health evaluation and promotion. The paradigm offers direction on the content, essence, and context of disaster nursing and can be used for all sudden-onset crises. By helping nurses get ready for disaster deployment, supporting disaster nursing education, and acting as a foundation for additional research and evidence-building, this review and the model can help.

Furthermore, Patricia Benner's Novice to Expert Model is utilized to assess how Public Health Nurses develop skills and understanding of patient care over time from a combination of a solid educational foundation and personal experiences, defined as behaviors that reveal mastery at work and can be applied to determine work standards and formulate strategies to describe individuals and teams, and training in disaster nursing to prepare nurses physically and psychologically to respond to disasters. The current review aimed to evaluate how prepared nurses are to deal with disasters in terms of their knowledge and skill competencies.

II. METHODS

A. *Design and Procedure*

This study utilized the descriptive quantitative research design to collect statistical information to analyze the population sample. A broadly used gap analysis technique allowed us to collect and classify specific demographic characteristics. Hence, the researchers chose this study design to investigate, describe, and explore the relationship between disaster literacy and public health nurses that could affect their disaster response performance and statistically analyze it. The survey questionnaire used in this study is one of the descriptive research techniques. The survey approach involved recording the public health nurses' answers through questionnaires or surveys. Thus, the researcher used questionnaires to collect and gather data from the respondents in this study. The public health nurses were identified using a population descriptive sampling technique. After completing the questionnaires, the public health nurses' responses were recorded for data analysis.

Research Locale

The study was conducted at the City Health Office- Main, one of the agencies under the Local Government Unit located at 124 Pichon St. Poblacion District, Davao City, Davao del Sur, Philippines. City Health Office was established through RA 9160 or the Local Government Unit 1991, a 900 square-meter headquarters catering to up to 70 clients daily. Researchers chose this place as it will provide the information needed in this study. The study will be conducted explicitly in the City Health Office, where health professionals such as doctors, dentists, nurses, medical technologists, and midwives provide public health and clinical services in the rural setting.

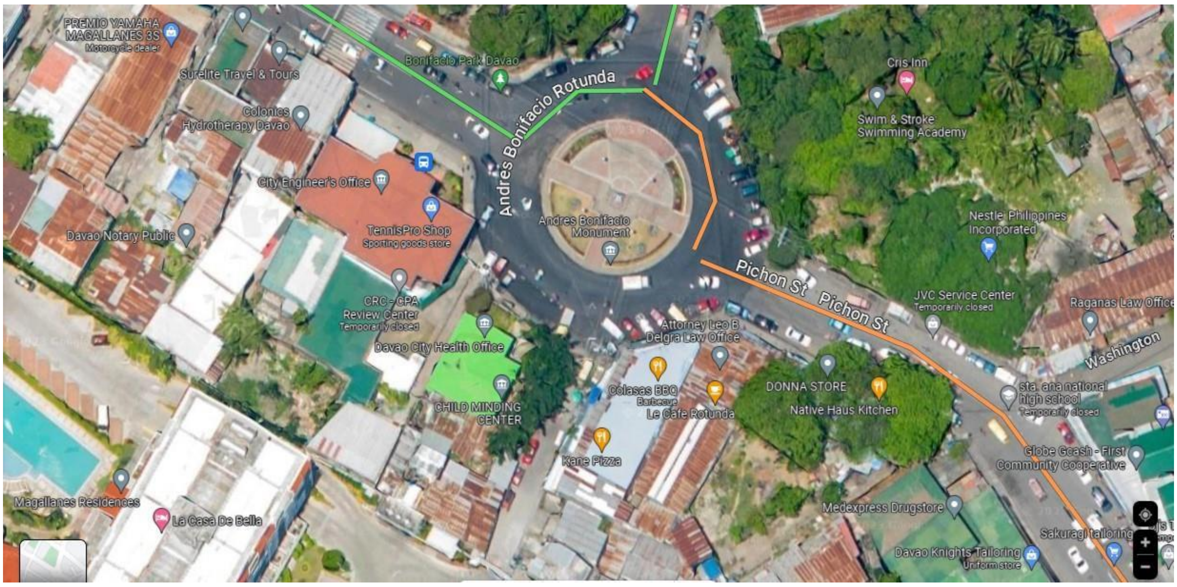

Figure 2. *Pichon St, Poblacion District Davao City*

Data Gathering Procedure

Before conducting research, the researchers sought approval and delegation of responsibility from the Dean's Office of the College of Health Sciences Education. The researchers utilized a questionnaire as a research tool. The panel members examined the survey questionnaires appropriately. Once approved, the researchers conducted a pilot study with 15 public health nurses participants to ensure the validity and reliability of the tools. The researchers used printed Survey Questionnaires for the pilot and actual tests. The researchers had 150 public health nurses to collect data for the study. After gathering the data, the statistician interpreted and analyzed it accordingly.

Statistical Tools

The following statistical methods were used to gather the data for this study: Percentage was used to determine the respondent's percentage based on their demographic profile. Mann-Whitney U Test was used to determine the significant difference between disaster literacy and public health nurses' disaster response performance in relevance to their demographic profile. Spearman's Correlation was applied to determine the significant relationship between disaster literacy and public health nurses' disaster response performance.

B. *Materials and Instruments*

Before undergoing any study-specific procedures, an Informed Consent Form (ICF) was completed. This attests that the public health nurses agreed to participate in the study voluntarily and without being forced. An explanation of the research and the nature of the participant's active participation is included in the consent form, along with a certificate of consent that the public health nurses must first sign to demonstrate their understanding of the study's purpose and their willingness to participate voluntarily. Experts in the field will be consulted to validate the consent form. In addition, the researchers used a Research Questionnaire (R.Q.) to identify the performance of public health nurses during disasters and its relationship to disaster literacy. The questionnaire was submitted to the thesis panel for assessment. The questionnaire is composed of three sections: (a) Demographic profile, (b)

Level of Disaster Literacy of Public Health Nurses, and (c) Level of Disaster Response Performance of Public Health Nurses. The researchers used the Likert scale for the 17-item questionnaire to assess the respondent's answers. The questionnaire encompasses five scales that will be used to rate the public health nurses' answers, each with its interpretation. A value of 5 states "Strongly Agree" and indicates a high level of agreement with the statement. A score of 4 states "Agree" and indicates agreement with the statement. A value of 3 states "Neutral" and indicates neither agreement nor disagreement with the statement. A score of 2 means "Disagree" and disagreement with the statement. Lastly, a score of 1 states "Strongly Disagree" and indicates a high level of disagreement with the statement. The panel members examined the survey questionnaires appropriately.

C. *Inclusion and Exclusion Criteria*

The research participants were public health nurses from different barangays in Davao. A population descriptive sampling method was used to identify the participants. The total population descriptive sampling technique is a teleological measurement technique wherein the total population (i.e., the total population) was examined for a particular number of characteristics. The sample frame contains the population of Public Health Nurses. Researchers used the population descriptive sampling technique to choose participants based on their knowledge and information gathered in the study. People participating in this study must be certified Public Health Nurses in the City Health Office of Davao City with a PRC license, regardless of age, gender, or religion. Participants in this study who are not a Public Health Nurse worker and Public Health Nurses who haven't responded yet to a disaster are not eligible. Furthermore, participant disengagement is a real possibility and sometimes unavoidable. A research participant may legally withdraw from a study at any time. The permission form makes it clear that participation is entirely voluntary and that declining to participate would not subject one to punishment or prevent one from receiving benefits for which one would otherwise be eligible. The participant must inform the researchers of their decision to terminate. Participants don't need to provide the researchers with an explanation for their decision to withdraw from the study.

D. Ethical Considerations

To protect the safety, well-being, and preservation of public health nurses' human rights, the researchers submitted a request letter to the College of Health Sciences Education Dean Ofelia C. Lariego, RN MAN LPT, asking for the authorization to carry out the study while adhering to all health and safety guidelines, before the start of this quantitative study.

Eventually, the researchers fulfilled the institution's authorities' study conditions. An informed consent form was provided to each public health nurse, and participation was voluntary. The researchers also intend to protect public health nurses' rights completely. Furthermore, the researchers ensured that the rights of public health nurses are fully protected. The following are the ethical guidelines that were strictly observed:

Voluntary Participation. The public health nurses in Davao City are not obliged to participate in this research study, following the principle of voluntary participation. They are free to sign the informed consent form without being forced to do so, indicating their willingness to participate.

Privacy and Confidentiality. Strict confidentiality will be maintained for this study. This means that all the data gathered from the Public Health Nurses workers in Davao City should be kept secret with their consent. Failure to follow this guideline could jeopardize the rights of the public health nurses in different barangays of Davao City.

Informed Consent. The public health nurses of different barangays in Davao City must provide valid and accurate information voluntarily and without compulsion. They will sign the consent form indicating that they understand the study's concepts, objectives, potential risks, and benefits and are willing to participate voluntarily. The Public Health Nurses of different barangays in Davao City must be free to withdraw from the study at any point without facing any retribution.

Recruitment. The researchers will guarantee that Public Health Nurses are given equal opportunities to participate in this study. People participating in this study must be certified public health nurses in Davao City and have a PRC license, regardless of age, gender, and religion. This is to uphold the ethical standards of research and enhance the validity and credibility of the study findings by ensuring a diverse and representative sample.

Risk. This study does not involve significant risk among the Public Health nurse workers in Davao City.

Benefits. The study results gathered from the Public Health Nurses in different barangays in Davao City will help government organizations, institutions, and community health interventions to help individuals during disasters. Additionally, it will help Public Health Nurses by giving them more information on how to respond during the onset of disasters. To contribute to the success of this research study, Public Health Health Nurses in different barangays in Davao City will receive a certificate of appreciation for their participation. Furthermore, since this study can be used as a reference for future research, it will benefit future researchers.

Plagiarism. The researcher ensures that other authors and experts adhere to accurate and appropriate citation guidelines of works. The grammar and plagiarism of the paper will be checked using Grammarly and Turnitin.

Fabrication. Since this study is based on previous studies, the researchers ensured that they did not make any claims based on their research. Therefore, every piece of information that will be supplied is appropriately referenced and documented. Every source used in this research came from reputable journals and other academic studies.

Falsification. This study follows the AMA citation style 10 edition guidelines; therefore, no work will be distorted, and the data obtained in the survey will not be altered. The facts and information acquired are provided with the most accuracy feasible.

Deceit. Nothing in this report was written in a way that would compromise the safety of the Public Health Nurses in different barangays in Davao City. All written content will be reviewed and approved by a panel of experts.

Observation. The researchers will give the office owners a consent letter, providing necessary information regarding the study. This will address an ethical issue when surveying the public by having notices placed at the entrance, for example, the traps, indicating that the researchers will be operating in this area at specific times.

Permission from Organization/Location. Furthermore, an approved permission letter from the Office of the Dean, Ofelia C. Lariego, RN MAN LPT, will be signed and noted before data gathering.

Authorship. This study involves numerous revisions, along with the guidance and recommendations of the research adviser, Dr. Renmir Jan Maala, RN, MAN, and two panelists, Dennis C. Padernilla, RN MN, and Junelle P. Silguera, RMT, MSMT. Once approved, the researchers will proceed with pilot testing. The data collected during this phase will be carefully examined and analyzed to determine the validity and dependability of the research tools used.

III. RESULTS AND DISCUSSION

This chapter discusses the findings of the presentation and analyzes them based on the statistical results. The discussions of findings are presented under the following headings: Demographic Profile of the Respondents, Level of Disaster Literacy, Level of Disaster Response Performance of Public Health Nurses, Significant difference between the level of Disaster Literacy and Disaster Response Performance when grouped according to their demographic profile, and Significant Relationship between the level of Disaster Literacy and Disaster Response Performance of Public Health Nurses of Davao City.

Table 1. Demographic profile of respondents

Profile Variables		Frequency	Percent
Sex	Male	50	33.3%
	Female	100	66.7%
Work Experience	1	114	76%
	2	36	24%

Table 1 above shows the distribution of the demographic profile of the 150 Public Health Nurses according to their sex and work experience. According to their sex, there are 50 male nurses, comprising 6.1% of the total respondents, and 100 female nurses, making up 12.2% of the total nurse population. According to their work experience, 114 have one year of work experience, which is 14% of the total, and only 36 nurses have two years of work experience, accounting for 4.4% of the total.

Table 2. Level of Disaster Literacy of respondents

	Mean	Standard Deviation	Descriptive Level
DL1	**4.65**	**.505**	**Very High**
DL2	4.51	.712	Very High
DL3	**3.39**	**.933**	**Moderate**
DL4	3.65	.760	High
DL5	3.58	.929	High
DL6	4.02	.798	High
DL7	3.46	.856	Moderate
DL8	3.74	.764	High
DL9	4.03	.709	High
DL10	4.07	.769	High
TOTAL	**3.91**	**.247**	**High**

Table 2 shows the respondents' disaster literacy results. The overall mean level of disaster literacy is 3.91, with a descriptive level of High, indicating that the disaster literacy level of public health nurses in Davao City is high.

The table shows the level of disaster literacy. Among all the statements, number 1 scored the highest and has a mean of 4.65 and a standard deviation of .505 with a descriptive level of Very High, which indicates that the Public Health Nurses have a very high level of knowledge of what a disaster, which means that they are well aware of the different disasters that could occur, and number 3 scored the lowest among the ten statements, it resulted with a mean of 3.39 and a standard deviation of .933 with the descriptive level of Moderate which indicates that the Public Health Nurses have moderate awareness that disasters are likely to happen in Davao City, which means that they lack understanding about the region's susceptibility to various types of disasters.

Table 3. Level of Disaster Response Performance of Public Health Nurses

	Mean	Standard Deviation	Descriptive Level
DR1	**4.89**	**.387**	**Very High**
DR2	3.73	.711	High
DR3	3.66	.684	High
DR4	3.88	.741	High
DR5	**2.15**	**.862**	**Low**
DR6	3.37	.755	Moderate
DR7	3.95	.838	High
TOTAL	**3.66**	**.356**	**High**

Table 3 shows the results of the Level of Disaster Response Performance. The overall mean is 3.66, and the standard deviation is .356, indicating that the Public Health Nurses in Davao City have a high disaster response performance.

The table shows the level of disaster literacy. Among all the statements, number 1 scored the highest and has a mean of 4.89 and a standard deviation of .387 with a descriptive level of Very High, which indicates that the Public Health Nurse has experienced being in a disaster, which means that they have been directly involved in or affected by a disaster situation. Number 5 scored the lowest among all the statements, with a mean of 2.15 and a standard deviation of .862, indicating that the Public Health Nurses did not have difficulty responding to the disaster victims.

Table 4.1 Significance of the difference between Disaster Literacy and Disaster Response Performance according to their sex

	U	**W**	**Z**	**Asymptomatic Significance (2-tailed)**
Disaster Literacy	2475.500	3750.500	-.098	.922
Disaster Response Performance	2486.000	7536.000	-.056	.955

Table 4.1 shows the results of analyzing the significant difference between the disaster literacy and disaster response performance of Public Health Nurses when grouped according to their sex with the use of the Mann-Whitney Test; the result shows that the significance of .922 for Disaster Literacy and .955 for Disaster Response Performance, both are above significance level of 0.05 which indicates that there is no significant difference between the Disaster Literacy and Disaster Response Performance of Public Health Nurses when grouped according to their sex. According to Jones, R., & Brown, K. (2019), gender was not a significant predictor of disaster knowledge[9].

Table 4.2 ***Significance of the difference between Disaster Literacy and Disaster Response Performance according to their work experience***

	U	**W**	**Z**	**Asymptomatic Significance (2-tailed)**
Disaster Literacy	1965.500	2631.500	-.383	.701
Disaster Response Performance	1912.500	8467.500	-.619	.536

Table 4.2 shows the results of analyzing the significant difference between the disaster literacy and disaster response performance of Public Health Nurses when grouped according to their work experience with the use of the Mann-Whitney Test; the result shows that the significance of .701 for Disaster Literacy and .536 for Disaster Response Performance are above significance level of 0.05 which indicates that there is no significant difference between the Disaster Literacy and Disaster Response Performance of Public Health Nurses when grouped according to their work experience.

Table 5. Significance of the relationship between Disaster Literacy and Disaster Response Performance of respondents

Correlations

			DisLit	**DisResp**
Spearman's rho	**DisLit**	**Correlation coefficient**	**1.000**	**.135**
		Sig. (2-tailed)	**.**	**.100**
		N	**150**	**150**
	DisResp	**Correlation coefficient**	**.135**	**1.000**
		Sig. (2-tailed)	**.100**	
		N	**150**	**150**

Table 5 shows the results of the Significant Relationship between Disaster Literacy and Disaster Response Performance of Public Health Nurses in Davao City. The significant correlation coefficient value of 0.135 indicates a slight correlation between the level of Disaster Literacy and Disaster Response Performance, which is also evident in the scatter plot. However, a significance of 0.100 indicates no significant relationship between Disaster Literacy and Disaster Response Performance. This supports a study that found a weak and negative relationship between knowledge and performance, revealing that knowledge may not necessarily influence desired performance. According to Ajzen et al. (2011), most educational campaigns, particularly in the health domain, concentrate on sharing accurate knowledge of a general nature. Once people have acquired knowledge, they are expected to engage in the desired performance. However, this approach often results in disappointment as people continue to take unnecessary risks or engage in socially undesirable behavior[10].

IV. CONCLUSION AND RECOMMENDATIONS

There are 150 respondents in this study; most are female, and almost all have only one year of experience as a public health nurse.

Regarding disaster literacy, the overall mean level of disaster literacy is 3.91 with a descriptive level of High, which indicates that the Level of Disaster Literacy of Public Health Nurses in Davao City is High.

Among all the statements in the level of Disaster Literacy, number 1 scored the highest and has a mean of 4.65 and a standard deviation of .505 with the descriptive level of Very High, which indicates that Public Health Nurses have a very high level of knowledge what a disaster is, which means that they are well aware of the different disasters that could occur. Number 3 scored the lowest among the ten statements; it resulted with a mean of 3.39 and a standard deviation of .933 with a descriptive level of Moderate, which indicates that the Public Health Nurses have moderate awareness that disasters are likely to happen in Davao City, which means that they lack understanding about the region's susceptibility to various types of disasters.

Regarding the Level of Disaster Response Performance, the overall mean is 3.66, with a standard deviation of .356, which indicates that the Public Health Nurses in Davao City have a high level of disaster response performance.

Among all the statements under Disaster Response Performance, number 1 scored the highest and has a mean of 4.89 and a standard deviation of .387 with the descriptive level of Very High, which indicates that the Public Health Nurses have experienced being in a disaster, which means that they have been directly involved in or affected by a disaster situation. Number 5 scored the lowest among all the statements, with a mean of 2.15 and a standard deviation of .862, indicating that the Public Health Nurses did not have difficulty responding to the disaster victims.

There is no significant difference in disaster literacy and disaster response performance when grouped according to their demographic profile, which is their sex and work experience. This indicates that each public health nurse's disaster literacy and disaster response performance cannot be based on their sex and work experience.

There is a slight correlation between disaster literacy and the disaster response performance of Public Health Nurses; however, there is no significant relationship between the two variables, which indicates that the disaster literacy of each public health nurse does not influence their disaster response performance.

Based on the results of this study, the researchers have developed a disaster preparedness plan. This plan ensures that all public health nurses, regardless of sex, work experience, or prior disaster literacy, can respond effectively to disasters.

Below are the proposed plan by the researchers:

- Develop a standardized disaster preparedness and response curriculum that all nurses must complete.
- Conduct mandatory regular disaster drills simulating various scenarios (natural disasters, pandemics, industrial accidents) to ensure all nurses are familiar with protocols and can perform under pressure.
- Implement mandatory continuing education courses to keep all nurses updated on the latest best practices and innovations in disaster response.
- Assign specific roles and responsibilities to each nurse in advance, based on their skills rather than their sex or experience level. Roles should be clearly defined and documented.
- Prepare standardized disaster response kits, including medical supplies, personal protective equipment (PPE), and communication tools. Ensure these kits are readily available and regularly checked.
- Maintain an updated list of emergency contacts and

resource providers accessible to all staff.

- Implement community education programs to raise disaster literacy among the general public. This can indirectly enhance the effectiveness of public health nurses by ensuring the community knows how to act during disasters.
- Conduct regular performance reviews during and after drills to identify strengths and areas for improvement.

With this proposed plan, the researchers believed that Public Health Nurses would be able to respond effectively.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following are recommended by the researchers:

The Local Government Unit could use the plan made by the researchers. The plan has been made to ensure that all public health nurses, regardless of sex, work experience, or prior disaster literacy, can respond effectively to disasters.

The researchers would also like the other researcher to use the interview to gather data to ensure that all information is precise. Other researchers could also widen their scope of respondents; instead of having public health nurses, they suggested having public health workers as respondents to assess their literacy level and disaster response performance.

REFERENCES

Acabado RG. Assessment on the Emergency and Disaster Preparedness of Healthcare Professionals in Davao City: Basis on a Proposed Enhancement Program. INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY STUDIES. 2021;1(1). https://ojs.jmc.edu.ph/index.php/Journal01/article/view/72

Pole T, Marcozzi D, Hunt RC. Interrupting My Shift: Disaster Preparedness and Response. Annals of Emergency Medicine. 2014;63(5):584-588. doi: https://doi.org/10.1016/j.annemergmed.2013.08.030

The National Disaster Risk Reduction and Management Plan NDRRMP.; 2011. https://www.dilg.gov.ph/PDF_File/reports_resources/DILG-Resources-2012116-420ac59e31.pdf

The National Disaster Risk Reduction and Management Plan NDRRMP.; 2011.https://www.dilg.gov.ph/PDF_File/reports_resources/DILG-Resources-2012116-420ac59e31.pdf

Usgs.gov. Published 2023. Accessed November 13, 2023. https://earthquake.usgs.gov/earthquakes/eventpage/us60006rp9/executive?fbclid=IwAR36xjqJ8_uTCy_U6yy6_8mmOgcdpv01E6upWlIKg_3zLivdu9HecdIJRYs

(PDF) Developing capacities of professional nurses on disaster risk reduction and management in the Philippine Nurses Association. ResearchGate.https://www.researchgate.net/publication/328268361_Developing_capacities_of_professional_nurses_on_disaster risk_reduction_and_management_in_the_Philippine_Nurses_Association

Pesiridis T, Sourtzi P, Galanis P, Kalokairinou A. Development, implementation and evaluation of a disaster training programme for nurses: A Switching Replications randomized controlled trial. Nurse Education in Practice. 2015;15(1):63-67. doi:https://doi.org/10.1016/j.nepr.2014.02.001

Building a skilled workforce to prepare for and respond to emergencies. www.who.int.https://www.who.int/activities/building-a-skilled-workforce-to-respond-to-emergencies

Gender Dimensions of Disaster Risk and Resilience: Existing ..., wrd.unwomen.org/sites/default/files/2021-11/Gender-Dimensions-of-Disaster-Risk-and-Resilience-Existing-Evidence.pdf.

Cahapay, Michael, and Rachel Patricia Ramirez. "Relationship between Science Literacy and Disaster Preparedness: The Possible Role of Curriculum in Behavior Theories." Asian Journal of Science Education, jurnal.usk.ac.id/AJSE/article/view/16803.

ANALYSIS OF PUBLIC HEALTH LAPSES TO COVID-19 PANDEMIC AND INNOVATIVE INTERVENTIONS FOR FUTURE HEALTH CRISESAMONG HEALTHCARE PROVIDERS IN DAVAO CITY

PATRICK JOHN S. ALBURO, PRINCESS JOY G. DELOS REYES, RENMIR JAN D. MAALA

Chapter 10

Analysis Of Public Health Lapses To Covid-19 Pandemic And Innovative Interventions For Future Health Crises Among Healthcare Providers In Davao City

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SDG Indicator: #3 (Good Health and Well-being), #6 (Clean water and sanitation), #11 (Sustainable cities and communities), #16 (Peace, justice and strong institutions), #17 (Partnerships for goals)

I. INTRODUCTION

In the past years, the world was alarmed by the cascading transmission of Coronavirus (COVID-19), which appeared in late 2019 in Wuhan, China. It is a disease that affects the respiratory system, is caused by the SARS-CoV-2 virus and threatens global health.[1] COVID-19 can be transmitted through direct contact and droplets from sneezing, coughing, and talking. Everything shifts from everyday living to strict adherence to safety precautions, and all healthcare providers are on the frontline facing the pandemic. Masks and face shields, gloves, frequent hand washing and sanitizers, and social distancing had become an everyday etiquette. The world becomes quiet as they watch news worldwide about the increasing infections and mortality rates. A single droplet could mean isolation and cause severe complications or death. Life has become restricted and caused poor coping strategies regarding health crises and environmental threats such as pandemics.[2]

The outbreak of COVID-19 uncovered shortcomings worldwide from its lack of hospital infrastructures to cater to the increasing number of

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patients admitted, the supplies in the hospitals ill-equipped with necessary materials, an impaired response from the government such as precautions on transmission and protection of public health, the decline in human resources such as the workforce of health care provider and lack of certainty of information dissemination. Interactions between the government and the hospital institutions are relevant to preventing infection transmission and the re-emergence of another outbreak. Thus, formulating strategies and adapting measures will aid in future health crises by utilizing Mondial strategies during C19 to better manage future pandemics. The Mondial strategies are composed of five measures: a) management: This focuses on the financial support for the hospital during health crises, improving the health system, and hiring adequate medical staff. B) protection: funds for purchasing protective equipment for hospital staff and organizing workload to avoid transmissions and burnouts of healthcare providers. C) Containment via control and suppression of transmission: This strategy highlights isolations, quarantine, and closing international entry. D) information: specifies dissemination of accurate and credible information about the disease and health measures and researching for possible vaccines and treatments; e) support aligns healthcare providers' approaches to precautions and emotional and financial support to each healthcare provider.[3]

The strategies mentioned above are ideally practiced globally; however, during the pandemic, many healthcare providers have a greater risk of acquiring COVID-19 due to direct contact with positive patients. Healthcare providers wear personal protective equipment (PPE) during patient care and practice hand hygiene. However, preventive measures among healthcare providers in Northwest Ethiopia only account for 38.7% due to the low economic status of the country, the shortage distribution of PPE, scarce diagnostic tests, turnover staffing, poor adherence to infection control, inadequate training, and differences in preventive measures. In the recent data collection, 43.3% of healthcare providers reported that they have gone to crowded areas, shaken hands, and hugged other people.[4] Studies also showed that 90% of the healthcare providers observed incorrect doffing of PPE, removing face shields, and touching contaminated surfaces.[5]

Moreover, age and gender were significantly associated with poor COVID-19 preventive practices. Female healthcare providers were discovered to be keener to practice proper hand washing than males. Two hundred fifty-three male healthcare providers in Northwest Ethiopia were found to be poorer in implementing preventive practices than females. According to the study by Kassie et al. (2020), ages 20-30 years old, especially men, are less likely to engage in health safety protocols during health crises, which can put a risk to the overall health of the patients.[6] In the study of Thai et al. (2021), the intense work pressure experienced during COVID-19 has caused one of the emergency department doctors in the US to commit suicide. Several studies in 19 countries revealed that about 40% of healthcare providers experienced anxiety, depression, or distress during the pandemic. Many healthcare providers are concerned about the lack of adequate medical treatments for positive patients, fear of becoming infected, and the absence of COVID-19 vaccines to prevent the spread of the virus.[7] According to the study by Delamarre et al. (2022), there was a massive training program conducted in Situ to train the operating room, ICU, and anesthesia staff for personal protective equipment (PPE) donning and doffing and COVID-19 airway/ventilation management in a concise time frame (2 weeks). Reducing cross-contamination and fostering staff coping strategies could minimize the rate of sick leaves brought by negative psychological impact and fear of being infected with COVID-19.[8]

In March 2020, COVID-19 engulfed the Philippines, throwing its healthcare heroes into a battle against both the virus and burnout. Already facing a pre-pandemic workforce shortage, Filipino nurses, the system's backbone, saw their workloads explode, their emotional capacity stretched thin by constant death and suffering. A study revealed an alarming burnout rate fueled by PPE shortages, limited mental health support, and unclear communication protocols.[9]

Several factors contributed to this decline in well-being. For one, the Philippines faced a shortage of healthcare providers before the pandemic. This scarcity was exacerbated by the sudden surge in COVID-19 cases, leaving existing staff stretched thin and struggling to cope.

Additionally, the emotional burden of providing care for terminally ill patients, witnessing death, and working under constant pressure further eroded the resilience of healthcare providers. A study revealed the multifaceted struggles faced by healthcare providers (HCPs). From anxieties of virus transmission to families to limited access to mental health services, the emotional burden was immense. Resource limitations like PPE shortages and unclear protocols added to the strain, while reaching diverse communities proved challenging due to cultural considerations, trust issues, and rural accessibility barriers.[10] However, these struggles offer valuable lessons. By prioritizing HCP well-being through comprehensive support and resource allocation, fostering clear communication, and implementing culturally sensitive community outreach programs, Davao can strengthen its healthcare system and ensure equitable care for all in future crises.

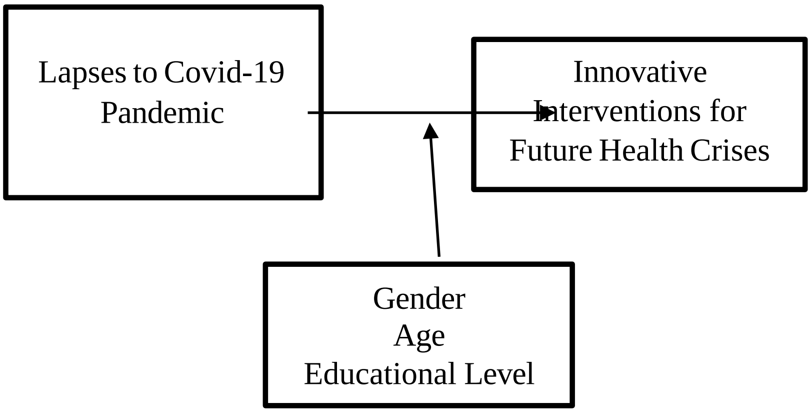
This research focused on public health lapses during COVID-19 among healthcare providers in Davao City, a city with over 1.7 million people in 2023. The study aimed to identify innovative interventions and coping strategies to address these issues. It also examined healthcare providers' public health shortcomings, specifically in Davao City during the pandemic, and proposed new responses for future health emergencies. The research also investigated elements that lead to successful community participation, such as communication techniques, community empowerment, and trust-building between local governments and inhabitants. The findings provided valuable insights and recommendations for healthcare providers, enabling them to improve preparedness and response to public health gaps for future health crises. The findings also helped create new solutions for future health crises, allowing healthcare providers to effectively protect the health and well-being of Davaoeños in Davao City.

This study seeks to examine the public health lapses in the Covid-19 pandemic among healthcare providers and explore innovative interventions to prepare Davao City for future health crises better. The findings of this research underscore the importance of implementing effective and strategic interventions in anticipation of future health emergencies. Specifically, it aims to answer the following questions;

1. What is the Demographic profile in terms of;
    1.1. Gender;
    1.2. Age; and
    1.3 Educational Level
2. What is the level of knowledge, attitudes, and practices of Healthcare Providers in Davao City during the pandemic?
3. Is there a significant difference in healthcare providers' knowledge, attitude, and practices when grouped according to their demographic profile?
4. What innovative and scientific health plan can be proposed based on the findings of the study?

Conceptual Framework

Independent Variable Dependent Variable


Lapses to Covid-19 Pandemic
Innovative Interventions for Future Health Crises
Gender
Age
Educational Level

Moderator Variable

Figure 1. Research Paradigm

Figure 1 shows the research paradigm above, which shows the difference between the variables. The lapses to the COVID-19 pandemic are the independent variable, while the innovative interventions for future health crises are the dependent variable. The demographic profile (gender, age, and educational level) is the moderating variable. The level of knowledge, attitudes, and practices of healthcare providers play an important role in determining the significant difference between the independent and dependent variables.

II. METHODS

A. Research Respondents and Locale

The study was conducted to assess the level of knowledge, attitudes, and practices of healthcare providers. The respondents of this study were the healthcare providers in Barangay 76-A Bucana, Davao City. The researchers chose this area because it has one of the highest cases of COVID-19 and can provide the needed information about the knowledge, attitudes, and practices of healthcare providers who have experienced the COVID-19 pandemic. The latest population in Barangay 76-A Bucana is 80,538, which makes it easier for researchers

to gather information. The researchers chose random respondents to participate in the research study.

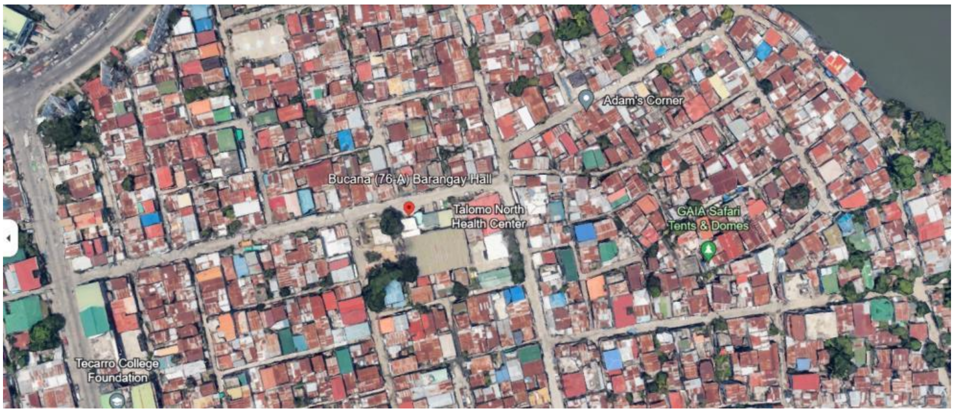

Adam's Corner
Bucana (76-A) Barangay Hall
Talomo North Health Center
GAIA Safari Tents & Domes
Tecarro College Foundation

Figure 2. Brgy. 76-A Bucana Davao City, Davao del Sur map

Retrieved on May 20, 2024 from https://earth.google.com/web/search/BARANGAY+76-A+BUCANA+DAVAO+CITY/@7.06319142,125.6023768,7.29645452a,486.43068823d,35y,0h,0t,0r/data=CigiJgokCRoa6iY0NBxAEUna0EdqMhxAGaB52GgmZ19AIe4rR7TpZl9AOgMKATA

B. Research Materials and Instruments

In this study, the researchers utilized a 25-item survey questionnaire answered by the healthcare providers in Davao City. The questionnaire was self-made. The research panel and research coordinator validated the questionnaire and thus passed. The research instrument has three parts: (a) knowledge, (b) attitudes, and (c) practices of healthcare providers. The items about healthcare providers' knowledge in Davao City were analyzed for Cronbach Alpha and resulted in 0.804, interpreted as good. The items in the attitude of healthcare providers resulted in 0.757 interpreted as good, and the items for the practices of healthcare providers resulted in 0.757 interpreted as good. A mean range between 4.20-5.00 indicates *very high,* and healthcare providers' knowledge, attitude, and practices are very evident. A range of mean between 3.40-4.19 means *high,* and the level of knowledge, attitude, and practices of healthcare providers is evident. A value between 2.60-3.39 indicates *moderate*. The level of knowledge, attitude, and practices of healthcare providers are somewhat evident. A score between 1.80-2.59 means *low*, and healthcare providers' knowledge, attitude, and practices are less evident. A range of mean between 1.00-1.79 indicates *a very low* level of knowledge, attitude, and practices of healthcare providers are not evident.

C. Design and Procedure

This research focused on a quantitative descriptive study. Quantitative descriptive research involves collecting information, wherein variables are measured utilizing numerical terms, and nothing is manipulated. It focused on what, where, when, and how questions, not why/how/when questions. Furthermore, it organizes, tabulates, depicts, and describes the data collection on the gathered data.[11]

The survey was conducted step-by-step, and the data gathering procedure follows: *Write a letter of approval.* Researchers gave a letter of approval to the Dean for conducting the study. Once approved, the letter was forwarded to the Barangay Captain in Barangay 76-A Bucana, Davao City, and to City Health. After being given permission, the researchers explained the purpose of the study to the selected healthcare providers. *Modify questionnaire.* The research panel, research adviser, and research coordinator modified and validated the questionnaire. In *pilot testing of the questionnaire*, researchers conducted pilot testing among healthcare providers in Davao City. 30 respondents were identified to be the respondents for the pilot study and 100 for the final, actual study. *Conduct a survey*. The researchers surveyed the level of knowledge, attitude, and practices among healthcare providers during COVID-19 to create innovative interventions for future health crises. The researchers explained to the healthcare providers the importance of their response to the study. *Sampling*. The researchers use simple random sampling, randomly selecting a subset of participants from Davao City. The researchers coordinated and asked permission from the Barangay Captain of Barangay 76-A and the City Health, respectively. After the data was collected and gathered, it was submitted and analyzed by the statistician.

III. RESULTS AND DISCUSSIONS

Established in this chapter is the analysis of findings based on the respondents' responses to the level of knowledge, attitude, and practices of the healthcare providers in Davao City. Tables are arranged in the following subheadings: the demographic profile, level of knowledge, attitude, and practices of the healthcare providers, and the significant difference in the knowledge, attitude, and practices of healthcare providers according to age, gender, and educational level.

Table 1 Demographic Profile of the Respondents, *n=100*

Profile Variables	f	%
Gender		
Female	68	68.0
Male	32	32.0
Total	100	100
Age		
22-28	12	12.0
29-35	24	24.0
36-42	13	13.0
43-49	24	24.0
50-56	20	20.0
57-63	5	5.0
64-70	2	2.0
Total	100	100
Educational Level		
College Graduate	71	71.0
Elementary Graduate	2	2.0
High School Graduate	23	23.0
Vocational	4	4.0
Total	100	100

Table 1 shows the demographic profile of the respondents. There were 100 respondents. When grouped according to gender, there were 68 females (68%) and 32 males (32%). In terms of age bracket, there were 12 respondents (12%) under ages of 22-28; 24 respondents (24%) under ages of 29-35; 13 respondents (13%)

under ages 36-42; 24 respondents (24%) under ages of 43-49; 20 respondents (20%) under ages of 50-56; 5 respondents (5%) under ages of 57-53; and 2 respondents (2%) under ages 64-70. Whereas on the educational level of healthcare providers, there were 71 respondents (71%) college graduates, 2 respondents (2%) elementary graduates, 23 respondents (23%) high school graduates, and 4 respondents (4%) vocational.

In the study of Almohammed et al. (2020), age and gender were found to be factored during COVID-19 preventive practices. It was discovered that female healthcare providers were more keen to practice proper hand washing than males. Healthcare providers ages 20-30 years old, especially men, are less likely to engage in health safety protocols during health crises, which can put a risk to the overall health of the patients.[6] Healthcare providers with higher levels of education had adequate knowledge and had a positive attitude during pandemic compared to healthcare providers with lower attainment of education.[12]

Table 2 Descriptive Statistics in the Level of Knowledge

Indicator	Mean	Std. Deviation	Interpretation
Knowledge of Healthcare Providers			
Question 1	4.6400	.59493	Very High
Question 2	4.7100	.53739	Very High
Question 3	4.6600	.58981	Very High
Question 4	4.5200	.79747	Very High
Question 5	4.6300	.61390	Very High
Question 6	4.5100	.84680	Very High
Question 7	4.7200	.55195	Very High
Total	4.6271	.43874	Very High

Table 2.2 shows the indicator "Knowledge of Healthcare Provider," revealing results in a total mean score of 4.6271 and a standard deviation of 0.43874, interpreted as *very high*, it indicates that healthcare practitioners

have a good degree of knowledge. This suggests that the knowledge levels of the healthcare practitioners polled are consistent. This uniformity in high knowledge levels across providers indicates a robust and consistent awareness of healthcare practices and information within the group. In line with this, a similar study was conducted by Khobrani et al. (2020), who stated that healthcare providers are knowledgeable in facing COVID-19, they have good practices, and have wisdom on the proper interventions given that they have access to and are facilitated technologies.[13]

Table 2.1 Descriptive Statistics in the Level of Attitude

Indicator	Mean	Std. Deviation	Interpretation
Attitudes of Healthcare Providers			
Question 1	4.7400	.48451	Very High
Question 2	4.5500	.86894	Very High
Question 3	4.6500	.80873	Very High
Question 4	4.6400	.70381	Very High
Question 5	4.7300	.48938	Very High
Question 6	4.7100	.47768	Very High
Question 7	4.6600	.66474	Very High
Total	4.6686	.39471	Very High

Table 2.1 shows the data for the "Attitude of Healthcare Providers" indicator, which shows a total mean score of 4.6686 and a standard deviation of 0.39471, indicates *very high*. This suggesting that healthcare providers have a very positive attitude. It indicates a slight variation in these beliefs among the providers polled. This low variability suggests that positive attitudes are consistently high across the sample, indicating a constant and favorable attitude regarding their duties and responsibilities in healthcare. This

constancy is a strength of the healthcare practitioners' approach, possibly leading to improved patient care and overall work satisfaction.

Furthermore, a study conducted in Abha, Saudi Arabia, demonstrated that frontline healthcare workers (HCPs) had good views regarding wearing goggles and gloves during healthcare-related illnesses. They answered attitude-related questions more positively than non-HCPs. HCPs with a more positive attitude are motivated to seek further information and expand their knowledge. According to the study, professional category and experience were essential predictors of preparedness to participate in hospital infection control and information sharing with peers.[13]

Table 2.2 Descriptive Statistics in the Level of Practices

Indicator	Mean	Std. Deviation	Interpretation
Practices of Healthcare Providers			
Question 1	4.6300	.56237	Very High
Question 2	4.7000	.62765	Very High
Question 3	4.6100	.58422	Very High
Question 4	4.7300	.48938	Very High
Question 5	4.6800	.54828	Very High
Question 6	4.6200	.61595	Very High
Question 7	4.7100	.51825	Very High
Question 8	4.7300	.52905	Very High
Question 9	4.6500	.72995	Very High
Question 10	4.5100	.89324	Very High
Question 11	4.7700	.42295	Very High
Total	4.6673	.39452	Very High

Table 2.2 shows the result of the indicator "Practices of Healthcare Provider," which has a total mean score of 4.6673 and a standard deviation of 0.39452, indicates *very high*. It suggests that healthcare practitioners typically participate in highly effective practices. It indicates that these procedures vary very little among

the providers examined. This low variability implies that a high level of effective practices is constantly maintained across the group, indicating an excellent adherence to set norms and standards. This consistency in practice is likely to result in high-quality patient treatment and can be seen positively in terms of healthcare practitioners' professional behavior.

A similar research concludes that hand cleanliness, proper PPE disposal, and proper hygiene are critical for infection control and are promoted by governments and stakeholders. According to a poll, 57% of healthcare practitioners agreed to follow all five WHO-recommended hand-washing measures. Attending hand hygiene training was a favorable experience for 77% of the participants.[13]

Table 2.3 Overall Results in the Level of Knowledge, Attitude, and Practices

Indicator	Total Mean	Total Std. Deviation
Knowledge of Healthcare Providers	4.6271	.43874
Attitudes of Healthcare Providers	4.6686	.39471
Practices of Healthcare Providers	4.6673	.39452
Overall KAP	4.6543	.34589

Table 2.3 shows the results of our study, which provides a complete assessment of healthcare provider's Knowledge, Attitude, and Practices (KAP). The mean score for Knowledge of Healthcare Providers is 4.6271, with a standard deviation of 0.43874, suggesting that individuals have very high degree of knowledge with relatively low variability. Healthcare providers' attitudes are marginally more favorable, with a mean score of 4.6686 and a standard deviation of

0.439471, indicating consistent answers throughout the group. Similarly, the practices of healthcare providers had a high mean score of 4.6673 and a standard deviation of 0.39452, indicating excellent and consistent procedures across the providers assessed. Overall, the combined KAP score has a mean of 4.6543 and a standard deviation of 0.34589, suggesting strong overall performance with minor variability, showing homogeneity in healthcare practitioners' knowledge, attitudes, and practices. These findings demonstrate a high degree of expertise and a favorable attitude among the study's healthcare practitioners.

This is anchored by the study of Ferdous et al. (2020), which states that knowledge, attitude, and practices are critical cognitive tools in public health for health prevention and promotion. It includes a variety of ideas regarding the causes and aggravating aspects of the condition, as well as the identification of symptoms and potential treatment options and consequences.[14]

According to Saudi Arabian research, healthcare providers' knowledge, attitudes, and practices play an important role during the epidemic. They also noted that the higher the KAP, the greater the protection or risk of the virus spreading. Healthcare workers' knowledge, attitudes, and practices (KAP) regarding COVID-19 influence their compliance with preventative and control measures.[15]

Table 3 Significance of the Difference of the Level of Knowledge, Attitude, and Practices in terms of Gender

Indicator	Gender	Mean	SD	t	p
Knowledge of	Male	4.5982	0.40801	-0.450	0.653
Healthcare Providers	Female	4.6408	0.45477		
Attitudes of	Male	4.6741	0.36147	0.096	0.924
Healthcare Providers	Female	4.6660	0.41198		
Practices of	Male	4.6165	0.42997	-0.882	0.380
Healthcare Providers	Female	4.6912	0.37766		

$p<0.05$

Table 3 shows no significant differences (p>0.05) in the level of knowledge, attitudes, and practices of healthcare providers when grouped according to gender. The respondents' understanding and practices of hygiene habits are the same. This indicates that each respondent did the same thing during the pandemic. To maintain oneself healthy and prevent COVID-19 transmission according to their gender. Respondents understand the use of alcohol-based face masks, safe disposal of facemasks, and the need for social distancing in preventing COVID-19 transmission.

In the study of Kim et. al (2020), their research confirms no significant difference in the level of knowledge, attitude, and practices among healthcare providers based on gender. This indicates that both male and female healthcare providers thoroughly understand disease transmission, implement appropriate preventive measures, and maintain proper hygiene standards. Their findings suggest that healthcare providers, regardless of gender, are equally informed about how diseases spread, committed to safety protocols, and diligent in hygiene practices. This uniformity underscores the effectiveness of current training programs and policies, which ensure that all healthcare professionals, irrespective of gender, are well-equipped to prevent and control infections. The study's conclusion highlights the importance of universal best practices in healthcare education and policy-making rather than gender-specific approaches.[16]

Table 3.1 Significance of the Difference of the Level of Knowledge, Attitude, and Practices in terms of Age

		Sum of Square	**df**	**Mean Square**	**F**	**p**
Knowledge of Healthcare Providers	Between Groups	2.560	6	.427	2.406	.093
	Within Groups	16.496	93	.177		
	Total	19.057	99			
Attitude of Healthcare Providers	Between Groups	.496	6	.083	.515	.796
	Within Groups	14.928	93	.161		
	Total	15.424	99			
Practices of Healthcare Providers	Between Groups	1.077	6	.179	1.164	.332
	Within Groups	14.332	93	.154		
	Total	15.409	99			

*p<0.05

Table 3.1 shows no significant differences (p>0.05) in the level of knowledge, attitudes, and practices of healthcare providers when grouped according to age. It shows that healthcare providers' knowledge, attitudes, and practices are consistent. The respondents were compliant in using PPEs properly, followed hand washing, disseminated proper and accurate information, and followed preventive measures.

According to the study by Olum et al. (2021), the knowledge, attitude, and practices of healthcare providers in Uganda aged 40 years and above had good practices and are knowledgeable. They also promote positive preventive measures and therapeutic practices in caring for clients.[17] In the study of Tegegne et al. (2021), older age with higher experiences were also significantly associated with effective practices and attitudes in the healthcare settings during the first few months of Covid-19.[18] Moreover, Ulrich et al. (2019), stated that young healthcare professionals also showed an overall positive attitude in collaborating with other healthcare providers and incorporated teamwork with other healthcare professionals in providing care for the client, practicing preventive measures, proper hygiene and information dissemination.[19]

Table 3.2 Significance of the Difference of the Level of Knowledge, Attitude, and Practices in terms of Educational

		Sum of Square	**df**	**Mean Square**	**F**	**p**
Knowledge of Healthcare Providers	Between Groups	.115	3	.038	.195	.900
	Within Groups	18.946	96	.197		
	Total	19.057	99			
Attitude of Healthcare Providers	Between Groups	.642	3	.214	1.390	.250
	Within Groups	14.781	96	.154		
	Total	15.424	99			
Practices of Healthcare Providers	Between Groups	1.663	3	.554		.012
	Within Groups	11.360	96	.143		
	Total	11.844	99			

*p<0.05

Table 3.2 shows the "Practices of healthcare providers" data reveals a significant difference ($p<0.05$) between high school graduates and college graduates. The data shows a noticeable significant difference between the two educational backgrounds, with high school graduates potentially adhering more consistently to certain practices than their college-educated counterparts.

Furthermore, research from Nigeria evaluated healthcare professionals' KAP during the pandemic and found that facility-based practitioners, who often have higher educational credentials, have better knowledge evaluations than community health workers. The study's findings highlight no clear relationship between healthcare providers' knowledge levels and the quality of their practices in Uganda. While higher educational attainment correlates with higher knowledge scores among providers, this sometimes needs to translate into improved practices consistently.[20] The study implies the importance of some factors, such as training opportunities and resource availability, in shaping healthcare practices. The result of the study revealed that high school graduates often outperformed college graduates in practice scores, suggesting that formal education level alone may not be the sole determinant of practical adherence. This discrepancy implies that factors like specialized training may influence the application of knowledge into practice. Consequently, efforts to enhance healthcare delivery and outcomes should encompass and addresses knowledge acquisition and provides adequate support, resources, and tailored training to empower healthcare providers to implement best practices effectively.[21]

IV. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study identified public health shortcomings during the COVID-19 pandemic among healthcare providers and investigated and implemented creative strategies to better prepare

Davao City for future health emergencies. The findings found that healthcare providers had a high degree of understanding of safety practices such as using a facemask, face shield, alcohol-based hand sanitizer, social distancing, and sanitary behaviors. The findings also demonstrated that healthcare providers conducted autonomous, effective, and strategic interventions throughout the pandemic. It also means that healthcare providers followed necessary and safe measures such as wearing and disposing of facemasks, face shields, alcohol-based sanitizer, social distancing, and practicing appropriate hygiene when interacting with patients to prevent COVID-19. However, despite the high level of knowledge, attitude, and practices of the healthcare providers, we cannot deny that equipping preparedness among healthcare providers for any possible future health emergencies can lessen the transmission of the disease and maintain the well-being of public health.

Recommendations

Based on the findings and conclusions of the study, the following are hereby recommended by the researchers:

Healthcare providers are encouraged to attend more seminars and training to improve their awareness of safety and other critical precautions during a pandemic. This will allow them to provide autonomous and appropriate interventions to patients while safeguarding their health.

The Barangay officials should maintain their safety protocols not just in the office but also in the community. They should also carefully execute and reinforce health preventive measures or safety health procedures to combat any possible viral transmission like COVID-19 in the future and restrict any unnecessary public gatherings to prevent the virus from spreading. Barangay officials are also encouraged to attend more seminars regarding health management; in this way, they can

The City Health Department should conduct and create a regular pandemic preparedness plan, including a clear outbreak response protocol, resource allocation, and communication strategies. They should have communication strategies where trust and compliance are built in the community. They should also hold lectures and training for healthcare providers on the interventions required whenever a community crisis arises. These will raise awareness of the potential threat in society, allowing them to intervene immediately and appropriately.

Future researchers may provide creative strategies to healthcare providers on how to execute different health practices in the community through informative materials such as fliers, video demonstrations, pictures, or infographics uploaded to social media platforms. Informative to effective responses when faced with future public emergencies.

REFERENCES

Pruthi, S., Allen, N., Blackmon, S., et al. Coronavirus disease 2019 (COVID-19).*Mayo Clinic.* 2020. https://www.mayoclinic.org/diseases-conditions/coronavirus/symptoms-causes/syc-20479963. July 23, 2023. Accessed on September 1, 2023.

Coccia, M. Pandemic Prevention: Lessons from COVID-19. *Encyclopedia*. 2021; *1*(2), 433-444. doi:10.3390/encyclopedia1020036.

Filip, R., Puscaselu, R. G., Anchidin-Norocel, L., Dimian, M., & Savage, W. Global Challenges to Public Health Care Systems during the COVID-19 Pandemic: A Review of Pandemic Measures and Problems. *Journal of Personalized Medicine*. 2022; 12(8): 1295. doi:10.3390/jpm12081295.

Belayneh, K.A,. et al., Poor COVID-19 Preventive Practice among HealthcareWorkers in Northwest Ethiopia. *Advances in Public Health*. 2020. Volume 2020;1-7. doi: 10.1155/2020/7526037

Birihane, A., K., Bayih, W., A., Alemu, A., Y. & Belay, D., M. Perceived Barriers and Preventive Measures of COVID-19 Among Healthcare Providers in Debretabor, North Central Ethiopia. *PubMed Central*. 2020. 13:, 2699-2706. doi: 10.2147/RMHP.S287772

Kassie, B. A., et al. Poor COVID-19 Preventive Practice among Healthcare Workers in Northwest Ethiopia. *Advances in Public Health.* 2020. Volume 2020; 1- 7. doi: 10.1155/2020/7526037

Thai, T. T., et al. Healthcare Workers’ Emotions, Stressor Experiences and Coping Strategies During the COVID-19 Pandemic in Vietnam. *National Library of Medicine*. 2021; 14: 4281- 429. doi: 10.2147/RMHP.S322929

1. Sazon, M. C. P., et al. Beyond PPE: Lived Experiences of Community Health Nurses in Managing COVID-19 in Davao City, Philippines. *International Journal of Nursing Sciences*. 2021;18(6), 709-715.
2. Studies L. Descriptive Research. Librarian Studies and Information Technology. 2022: https://www.librarianshipstudies.com/2022/10/descriptive-research.htm. Accessed on January 12, 2024.
3. Almohammed, O., et al. Knowledge, Attitude, and Practices Associated with Covid-19 Among Healthcare Workers in Hospital: A Cross-sectional Study in Saudi Arabia. *Frontiers*. 2021 (9). doi.org/10.3389/fpubh.2021.643053.
4. Khobrani, Moteb, et al. "Evaluation of Health Care Professionals' Knowledge, Attitudes, and Practice to Prevent the Pandemic Spread of COVID-19: A Questionnaire-Based Cross-Sectional Study from Abha, Saudi Arabia." *Healthcare MDPI*. 2020 (11)4: 509. doi.org/10.3390/healthcare11040509.
5. Ferdous, Most. Z., et al. Knowledge, Attitude, and Practice regarding COVID-19 Outbreak in Bangladesh: An Online-based Cross-sectional Study. *PLOS ONE.* 2020 (15);10. doi.org/10.1371/journal.pone.0239254.
6. Basheeruddin Asdaq, Syed M., et al. "Knowledge, Attitude and Practices of Healthcare Professionals of Riyadh, Saudi Arabia towards Covid-19: A Cross-sectional Study." *Saudi Journal of Biological Sciences*. 2021(28)9; 5275-5282. doi.org/10.1016/j.sjbs.2021.05.036.
7. Kim, Jung K., and Eileen M. Crimmins. How Does Age Affect Personal and Social Reactions to COVID-19: Results from the National Understanding America Study. *PLOS ONE.* 2020(15); 11. doi.org/10.1371/journal.pone.0241950.
8. Olum, R., et al. Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals, Uganda. *Frontiers.* 2020(8). doi.org/10.3389/fpubh.2020.00181.

9. Tegegne, G., et al. Knowledge, Attitude, and Practice of Healthcare Providers toward Novel Coronavirus 19 during the First Months of the Pandemic: A systematic review. *Frontiers*. 2021 (9). doi.org/10.3389/fpubh.2021.606666.
10. Ulrich, G., et al. Attitudes towards interprofessional collaboration in young healthcare professionals. *Journal of Interprofessional Care.* 2019 (33)6. doi.org/10.1080/13561820.2019.1597839.
11. Orji, B., Oliveras, E., Odio, B. et al. Knowledge, attitudes and practices of infection prevention and control among healthcare workers during the COVID 19 pandemic: a descriptive cross-sectional study in three Nigerian states. BMC Health Serv Res 23, 253 (2023). https://doi.org/10.1186/s12913-023-09218-9
12. Rattay, Petra, et al. Differences in Risk Perception, Knowledge and Protective Behaviour regarding COVID-19 by Education Level among Women and Men in Germany. Results from the COVID-19 Snapshot Monitoring (COSMO) Study. *PLOS ONE*. 2021(16);5 2021. doi.org/10.1371/journal.pone.025169.

DETERMINATION OF RATIONAL DRUG USE IN BREASTFEEDING MOTHERS

Tuba GÜNER EMÜL

Chapter 11

Determinatıon of Rational Drug Use In Breastfeeding Mothers

TUBA GÜNER EMÜL[1]

Breastfeeding is a unique and important experience for mothers and their babies. Mothers want to experience this process in a healthy way, uninterrupted and for a long time. However, mothers and babies may unfortunately be deprived of this unique experience due to lack of information and concerns that the medications used by mothers for various reasons may pass into breast milk and affect the baby negatively (Kaplan vd., 2019; Mcclary, 2015). When the literature was examined, it was found that mothers frequently used painkillers, anesthetics and antibiotics during breastfeeding (Acar vd., 2018; Demir & Taşpınar, 2019; Kaplan vd., 2019; Lawrence & Lawrence, 2015;).

It is important that drug use during breastfeeding is individualized and evidence-based. When medication is started during breastfeeding, mothers may interrupt breastfeeding due to the concern that the medication will be passed to the baby through breast milk and may put the continuation of breastfeeding at risk (Kaplan vd., 2019; Sangalli vd., 2000). The World Health Organization (WHO) defines rational use of medicines as a set of rules in which the treatment process is carried out in accordance with the needs of individuals and time, in adequate dosage and at low cost (WHO,1987; WHO, 2012). Irrational drug use (IDU) is an important health problem worldwide, especially in developing countries, and is defined as drug use behaviors such as individuals adjusting their doses on their own and taking or stopping medication, as well as reasons arising from the supply chain of the drug, starting from the prescription software, the regulations within the health system (WHO,2012). Factors such as socio-demographic characteristics (age, education level, income level, etc.), written/visual media, experiences and experiences, and lack of access to health services may be effective in irrational drug use (Açıksöz vd., 2020; Cabral vd., 2016; El Khoury vd., 2018).

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Rational drug use may lead to increased incidence of adverse effects, prolonged or recurring diseases and increased treatment costs (Askari vd., 2013). Midwives and nurses are the first and important health professionals that mothers consult. When breastfeeding mothers start using medication, it is important for the continuity of breastfeeding to determine the appropriate medication with the information obtained from reliable sources, to make a benefit and harm analysis and to inform the family about the side effects that may be seen in the baby. It has been observed that there are studies on rational drug use in pregnant women, but studies on the lactation period are very limited. In this study, it was aimed to determine the rational drug use of women during lactation and to contribute to the literature.

Research question

What is the level of rational drug use among breastfeeding women?

Methods

Type of Research

The study was designed as a descriptive study.

Population and Sample of the Study

The population of the study consisted of breastfeeding women living in Turkey. Purposive sampling method was used to determine the sample of the study. G*Power 3.1.9.7 trial version (Institute for Experimental Psychology, Heinrich-Heine University, Dusseldorf, Germany) was used to calculate the required sample size. According to the regression analysis including 17 predictors with an alpha level of 0.05, 90% power and small-medium effect size (f2 = 0.09), the minimum number of breastfeeding women to be included in the study was calculated as 229 and a total of 325 women were reached between the study dates. The inclusion criteria were women who volunteered to participate in the study, who were Turkish citizens, and who were breastfeeding.

Data Collection Tools

The data were collected with a data collection form consisting of a "Personal Information Form" and a "Rational Drug Use Scale".

Personal Information Form

The personal information form included nine questions about the socio-demographic characteristics of the women created by the researchers.

Rational Drug Use Scale

The rational drug use scale was developed by Demirtaş et al. (2018). The scale consists of one dimension and 21 questions. The questions in the scale are evaluated as "Correct Answer=2", Don't Know=1 Wrong Answer=0". The scores that can be obtained from the scale vary between 0-42.

Data Collection

This descriptive and cross-sectional study was conducted in Turkey between May and September 2023. Data were collected through social media (Facebook, Twitter, Instagram, etc.) using a web-based online survey (Google forms-Google LLC, MountainView, CA, USA). The first page of the online survey included information about the purpose and content of the study and a consent form to participate in the study.

Data Evaluation

A statistical package program was used to evaluate the data obtained from the study. The variables were evaluated after the prerequisites of normality and homogeneity of variances were checked (Shapiro Wilk and Levene Test). Student's t test statistic was used to compare the means of two independent groups and One Way ANOVA test statistic was used to compare the means of more than two groups. If a difference was detected with ANOVA, it was evaluated with Tukey statistics as a Post Hoc test. A value of $p<0.05$ was accepted for the significance level of the tests.

Ethical Dimension

Before starting the application, permission was obtained from Toros University Clinical Sciences Ethics Committee to conduct the study. In addition, the women participating in the study were informed about the purpose of the study and the protection of confidentiality and privacy and that they could leave the study at any time via Google Form. Women who volunteered to participate in the study were asked to check the option indicating voluntariness before completing the questionnaire. Participants who did not check this option were restricted from accessing the following sections of the questionnaire. Data were collected in accordance with the principles of the Declaration of Helsinki.

When Table 1 was analyzed, it was seen that breastfeeding mothers scored 34.20±4.36 (30-53) points from the rational drug use scale.

Results

Table 1. Rational drug use scale scores of breastfeeding mothers

	X±std	**Min- Max**
RDUS	34.20 ±4.36	30-53

The mean age of breastfeeding mothers was 32.3±6.11 (18-48). When the mean scores of the rational drug use scale were examined according to the mothers' education level, it was found that the mean score of the scale increased as the mothers' education level increased and there was a significant difference ($p<0.005$) (Table 2). When Table 2 was examined, it was determined that the mean rational drug use scale score was higher in Eastern Anatolia and Aegean regions according to the region where the mothers lived the longest and there was a significant difference ($p<0.005$). However, when the mean scale scores of the mothers according to their employment status were examined, it was seen that the mean score of the working mothers was higher and there was a significant difference ($p<0.005$).

Table 2. Rational drug use of breastfeeding mothers according to their sociodemographic characteristics

	n	%	X±std	Statistical value
Education Status				
Literate	19	5.8	33.59±3.78	**P=0.000**
Primary school graduate	61	18.8	33.39±3.74	F=19.644
High school graduate	88	27.1	35.80±6.82	
Bachelor's degree	157	48.3	45.11±5.57	
Longest inhabited region				
Eastern Anatolia	19	5.8	37.26±5.99	
Mediterranean	205	63.1	33.74±4.20	**P=0.000**
Aegean	13	4.0	37.15±3.78	F=10.370
Marmara	23	7.1	30.56±1.03	
Central Anatolia	44	13.5	36.40±3.66	
Southeast Anatolia	21	6.5	33.20±4.36	
Income Status				
Income more than expenditure	94	28.9	34.02±5.09	P=0.773
Income matches expenditure	206	63.4	34.22±4.04	F=0.257
Income less than expenditure	25	7.7	34.72±4.08	
Employment Status				
Yes	182	56.0	35.91±4.80	**P=0.000**
No	143	44.0	32.85±3.45	T=-6.67
Medication use during breastfeeding				
Yes	132	40.6	33.07±3.43	P=0.457
No	193	59.4	34.97 ±4.76	
Continuous medication use				
Yes	100	30.8	35.51 ±4.45	**P=0.000**
No	225	69.2	33.06±4.43	

In addition, it was found that the mean score of mothers who used continuous medication was higher and the difference was significant

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Discussion

One of the important problems affecting public health is irrational drug use. Irrational drug use decreases individuals' compliance with treatment, causes the development of drug resistance and increases hospitalization and treatment costs. In terms of maternal and infant health, irrational drug use may lead to interruption of breastfeeding or early termination of breastfeeding. In our study, it was observed that breastfeeding mothers scored 34.20±4.36 (30-53) points from the rational drug use scale. According to this result, it was determined that the level of rational drug use knowledge of breastfeeding mothers was not sufficient in our study. As far as the literature was examined, it was seen that there were studies on pregnant women and adults, but studies on rational drug use in breastfeeding mothers were very limited. When the studies found were evaluated, Hamzaoğlu et al. (2023) found that mothers were careful and cautious in drug use during breastfeeding in their qualitative study. Uçman & Uysal (2021) found that rational drug use was sufficient in a study conducted for adults. Kan & Sevim (2023) found that rational drug practices were sufficient in their study. In this context, inadequate knowledge of rational drug use in our study may be due to the fact that it was in a different population and that they avoided using drugs due to the concern that the drugs used may be passed to the baby through breastfeeding and the baby may be harmed.

In our study, when the mean scores of the rational drug use scale according to the education level of the mothers were examined, it was found that the mean score of the scale increased as the education level of the mothers increased and there was a significant difference (p<0.005). In studies conducted by Akyol Güner et al. (2020), Bian et al. (2015), Çobanoğlu (2020) and Demirtaş et al. (2018), it was shown that individuals with higher education levels had higher levels of rational drug use knowledge. These results are similar to our research finding. The increase in the level of education can be explained by the fact that they are more conscious about accessing information. When Table 2 was examined, it was determined that the mean rational drug use scale score according to the region where the mothers lived the longest was higher in Eastern Anatolia and Aegean regions and there was a significant difference. However, it was observed that the mean score of working mothers was higher and there was a significant difference. This may be associated with their level of education. In our study, when the status of continuous medication use was analyzed, it was found that mothers who used continuous medication had higher knowledge of rational drug use compared to non-users. This may be due to the fact that individuals who use continuous medication are more conscious and experienced.

Consclusion

As a result of the study, it was determined that the level of rational drug use of breastfeeding mothers was not sufficient. In this context, it was revealed that in order to increase the level of rational drug use, drug use awareness should be provided to mothers in the lactation process under the supervision of health personnel. In this context, it may be recommended that in-service trainings should be provided to healthcare professionals in a continuous, up-to-date and effective manner, as well as trainings should be provided to individuals on correct drug use and support should be obtained from social media in this regard.

References

Acar, A.F., Mutlu, M., Aslan, F. 2018. Yenidoğan Döneminde Emziren Annelerde İlaç Kullanımı ve Yenidoğan Bebeğe Etkileri. *Klinik Tıp Aile Hekimliği Dergisi*,10(4),205-212

Açıksöz, S., Kurt, G., Seyfi, M. 2020. Hemşirelik Öğrencilerinin Reçetesiz İlaç Kullanma Durumları. *Koç Üniversitesi Hemşirelikte Eğitim ve Araştırma Dergisi,* 17(1): 17-23. doi:10.5222/HEAD.2020.017

Akyol Güner, T., Kuzu, A., Bayraktaroğlu, T. 2020. Diyabetli kişilerde Sağlık Okuryazarlığı ve Akılcı İlaç Kullanımı Arasındaki İlişki. *Türkiye Diyabet ve Obezite Dergisi,* 4(3): 214-223. https://doi.org/10.25048/tudod.775075

Askari, M., Eslami, S., Louws, M. 2013. Frequency and Nature of Drug İnteractions in the İntensive Care Unit. *Pharmacoepidemiology and Drug Safety,* 22(4):430-7

Bian, C., Xu, S., Wang, H., Li, N., Wu, J. 2015. Correction: A Study on the Application of the İnformation-Motivation-Behavioral Skills (ımb) Model on Rational Drug use Behavior Among Second-level Hospital Outpatients in Anhui, China. *Plos One*, 10(9),137928

Cabral, C., Ingram, J., Lucas, P.J., Redmond, N.M., Kai, J., Hay, A.D., Horwood, J. 2016. Influence of Clinical Communication On Parents’ Antibiotic Expectations for Children With Respiratory Tract İnfections. *The Annals of Family Medicine*, 14(2):141-147. doi: 10.1370/afm.1892

Çobanoğlu, A. 2020. Gebelerin İlaç Kullanım Durumu ve Güvenli İlaç Kullanımı Bilgilerinin İncelenmesi. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*, 23(4),463-9.

Demir, R., Taşpınar, A. 2019. Gebelikte Akılcı İlaç Kullanımı. *Arşiv Kaynak Tarama Dergisi*, *28* (3): 193-200.

Demirtaş, Z., Dağtekin, G., Sağlan, R., Alaiye, M., Önsüz, M.F., Işıklı, B, Kılıç, F.S., Metintaş, S. 2018. Akılcı İlaç Kullanımı Ölçeği Geçerlilik ve Güvenilirliği. *Eskişehir Türk Dünyası Uygulama ve Araştırma Merkezi Halk Sağlığı Dergisi*, 3(3):37-46

El Khoury, G., Ramia, E., Salameh, P. 2018. Misconceptions and Malpractices Toward Antibiotic Use in Childhood Upper Respiratory Tract Infections Among a Cohort of Lebanese Parents. Evaluation &amp; *The Health Professions.* 41(4), 493-511. doi: 10.1177/0163278716686809

Hamzaoğlu, E.B., Kuğuoğlu, S., Ekici, B. 2023. Annelerin ve Sağlık Çalışanlarının Emzirme Döneminde İlaç Kullanımına İlişkin Görüşleri: Nitel Bir Çalışma. *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi*, 12(1): 211-220. https://doi.org/10.37989/gumussagbil.908574

Kan, Z., Sevim, E. 2023. Sağlık Okuryazarlığı İle Akılcı İlaç Kullanımı Arasındaki İlişkinin İncelenmesi. *Hacettepe Sağlık İdaresi Dergisi*, 26(3):641-54.

Kaplan, Y.C., Uysal, N., Arslan, E.K., Acar, S. Harvey, C. 2019. Emzirme Döneminde İlaç Kullanımı. *Türk Aile Hek Derg*, 23 (4),176-185.

Lawrence, R.A., Lawrence, R.M. 2015. Breastfeeding: A Guide for the Medical Profession. "Medications, Herbal Preparations, and Natural Products in Breast Milk". 8th Edition. Philadelphia, Elsevier, 364-406.

Mcclary, M.D. 2015. Principles of Drug Use During Lactation. In: Martin RJ, Fanaroff AA, Walsh MC, eds, Fanaroff and Martin's Neonatal Perinatal Medicine. 10th edition, Vol.2. Philadelphia: Saunders. 660-4.

Sangalli, B.C., Sangalli, B., Chiang, W. 2000. Toxicology of nutmeg abuse. *Journal of Toxicology: Clinical Toxicology*,38 (6),671-678.

Uçman, T., Uysal, N. 2021. Yetişkin Bireylerde Akılcı İlaç Kullanımı ve Etkileyen Faktörlerin Belirlenmesi. *BANÜ Sağlık Bilimleri ve Araştırmaları Dergisi*,3(2),126-133.

WHO.1987. The rational use of drugs: report of the conference of experts, Nairobi, 25-29 November 1985. Albany NY, WHO Publications Center USA

WHO. 2012. The rational use of drugs: report of the conference of experts, Nairobi, 25-29 November 1985. Albany NY, WHO Publications Center USA